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THE

CAMBRIDGE NATURAL HISTORY

EDITED BY

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VOLUME IX

NORTH POLAR CHART

Scale of Nature 1 to 47,830,000.

SOUTH POLAR CHART

Scale of Nature 1 to 95,660,000
(Half the scale of North Polar Chart)

SOUTH ATLANTIC OCEAN
SOUTH PACIFIC OCEAN
INDIAN OCEAN
ANTARCTIC SEA
SOUTH AMERICA
AUSTRALIA
NEW ZEALAND
The Andes
Papua
Cape Town
C. of Good Hope
C. Agulhas
Northern Limit of Drift Ice
Southern Limit of Drift Ice
Tropic of Capricorn
Tropic of Capricorn
Pr. Edward Is.
Crozet Is.
St. Paul
Amsterdam I.
Kerguelen I.
Tristan da Cunha I.
Diego Alvarez or Gough I.
Average Limit of Drift Ice
Thompson I.
Lindsay I.
Beauvoir I.
McDonald I.
Heard I.
Antarctic Circle
Enderby Ld.
Kemp Ld.
Pack Ice
Sandwich Group
S. Georgia
S. Orkney Is.
Magnetic Pole 1885
Termination of Lands?
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Knox Land
Budd Land
Sabrina
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North Land
Porpoise B.
Clarie Land
Adelie Land
Pr. Emmme
Hudson Mts.
Reynold Peak
Sabrina Land
Victoria Land
Franklin I.
Coulman I.
Possession I.
Balleny Is.
Macquarie I.
Emerald I.
Auckland Is.
Campbell I.
Antipodes Is.
Bounty Is.
Dundas I.
Chatham I.
Christchurch
Wellington
Auckland
South I.
North I.
Cook Str.
Dunedin
Hobart
Melbourne
Sydney
Brisbane
C. Howe
Great Barrier Reef
Torres Str.
Gulf of Carpentaria
Flinders R.
Murray R.
Darling R.
Spencer G.
Kangaroo I.
Adelaide
L. Eyre
L. Gairdner
Tasmania
Recherche Archo.
Great Australian Bight
L. Amadeus
C. Leeuwin
Perth
Lt. Austin
Kg. George Sd.
Murchison R.
Shark B.
Eyre
Eyre Pen.
Eyre Mts.
Eyre Creek
Darling Range
Swan R.
Timor
Flores
Sumbawa
Lombok
Bali
Sumatra
Batavia
Sunda Strait
Bencoolen
Lord Howe I.
New Britain
New Ireland
Solomon Is.
New Caledonia
Loyalty Is.
New Hebrides
Norfolk I.
Coral Sea
Fiji Is.
Kermadec Is.
Wellington I.
Strait of Magellan
Tierra del Fuego
Cape Horn
Falkland Is.
Shetlands
Elephant I.
Dundee I.
Dirk Gerritz Arch.
Graham Land
Alexander I. Ld.
Bahia Blanco
Buenos Ayres
Monte Video
Rio de la Plata
R. Uruguay
R. Paraguay
R. Parana
R. Salado
R. Colorado
Rio de Janeiro
Santos
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Juan Fernandez
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Santiago
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Copiapo
Coquimbo
Arica
Iquique
L. Titicaca
Lima
Callao
R. Maranon
Magellan Str.
Sea of Japan
Papua
Sea of Japan
Sea of Japan
Sea of Japan

BIRDS

By A. H. Evans, M.A., Clare College, Cambridge

London
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1900

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In sicco ludunt fulicae.—VIRGIL.

"Loons disport themselves on dry matters."

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PREFACE

In this volume of the "Cambridge Natural History" the author has attempted to meet a need which he believes to be somewhat widely felt. Recognising the fact that there is at the present time an abundance of popular, or only slightly scientific, works on Birds, some of which touch but superficially upon the individual species composing the various groups, as regards their plumage or habits, while others pay little or no attention to correctness of Classification, he has essayed the difficult and apparently unattempted task of including in some six hundred pages a short description of the majority of the forms in many of the Families, and of the most typical or important of the innumerable species included in the large Passerine Order. Prefixed to each group is a brief summary of the Structure and Habits; a few further particulars of the same nature being subsequently added where necessary, with a statement of the main Fossil forms as yet recorded.

Thus it is hoped that the work may be of real use, not only to the tyro in Ornithology, but also to the traveller or resident in foreign parts interested in the subject, who, without time or opportunity for referring to the works of specialists, may yet need the aid of a concise account of the species likely to cross his path.

An introductory chapter has been written, to meet the claims of the present day, on the external and to a limited extent on the internal structure of Birds, with short paragraphs on Classi-

fication, Geographical Distribution, and Migration, and a "Terminology" of the subject.

In accordance with the scheme of the Series generally, the order followed runs from the lowest forms and the Ratite Birds upwards; the Carinate Birds being divided, after Dr. Gadow's plan, into two Brigades or main sections, and these again into Legions, Orders, and so forth. It should, however, be understood that the *Species* of each Genus are often merely placed in the most convenient order; and that, where a geographical range is given, it does not follow that it is unbroken from end to end.

In descriptions of colour, the names used for tints in the British Museum Catalogue of Birds have been commonly adopted, or for British species those in Mr. Howard Saunders' *Manual of British Birds.*

Various subjects of a highly technical, or at least of a special character, have purposely been avoided in the main, as unfitted to the scope of the work; such are, Variation and Hybrids, with their accompaniments of Dimorphism, Dichromatism, and the like; Myology; Mechanism of Flight and the supposed Lines of Flight on Migration; the Classifications of Linnæus and the older writers; and the Strickland Code of Ornithological Nomenclature. For these Professor Newton's *Dictionary of Birds*, and especially the Introduction to it, may be consulted; besides a multitude of other works.

The woodcuts have been chiefly supplied by Mr. G. E. Lodge; but a few illustrations have been utilized from other sources.

The author does not hold himself responsible for the fact of the Family names being in Roman in place of Italic type, nor for the dissociation of the vowels in the diphthongs; in these minor points he personally differs from the writers of the former volumes, though he agrees with the wish of his Editors for uniformity.

In conclusion, he must take the opportunity of acknowledging the invaluable assistance afforded by Mr. Howard Saunders, who carefully went over the whole of the proofs, while Dr. R. B. Sharpe was kind enough to do the same; nor must he fail to record his indebtedness to Professor Newton, Mr. Sclater, Dr. Gadow, Mr. Ogilvie Grant, and many others, not to mention the innumerable authors without whose previous labours to write a book of this description would be a well-nigh impossible task. Dr. Stejneger's Volume on Birds in the *Standard Natural History* should be mentioned in particular.

A. H. Evans.

Cambridge, *November* 17, 1898.

ADDENDUM

SINCE the text has been printed off, several new species have been described, and of these it is necessary to mention at least the following;—

Archaeopteryx siemensi, from Solenhofen, where the original form was obtained.—(Dames.)

Euryapteryx exilis (Dinornithidae); a new genus, *Anomalornis*, is also proposed for *Anomalopteryx* (preoccupied).—(Hutton.)

Ammoperdix cholmleyi (Phasianidae), from Suakin.—(Ogilvie-Grant.)

Cepphus snowi (Alcidae), from the Kurile Is.—(Stejneger.) The range of *C. columba* will now be "Bering Sea to California;" and of *C. carbo* "North-East Asia and Japanese Seas."

Podoces pleskii (Corvidae), from East Persia.—(Zarudny.)

Some new fossil forms from Patagonia.—(Mercerat.)

Mr. F. E. Blaauw has published a Monograph of the Cranes, and Mr. C. W. de Vis has described the eggs and young of *Salvadorina* (Anatidae).

In all these cases the *Zoological Record* for 1897 may be consulted.

In 1898 Mr. F. E. Beddard's *Structure and Classification of Birds* was issued in London; and Dr. A. B. Meyer and Mr. L. W. Wiglesworth's *Birds of Celebes* in Berlin.

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Order.	Group.	Division.	Family.	Sub-family.
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			ICTERIDAE (p. 579)	Cassicinae, Agelaeinae, Sturnellinae, Icterinae, Quiscalinae (p. 579).
			FRINGILLIDAE + EMBERIZIDAE	(p. 582).

CHAPTER I

INTRODUCTION

Definition.—"A Bird is a feathered biped." This popular saying undoubtedly furnishes a definition in the world of to-day, since no other existing creature has a clothing of feathers, and even the word "biped" is thus superfluous.

The above should, however, be somewhat expanded, in order to shew in greater detail the differences between Birds and other Vertebrata. Care must nevertheless be taken to avoid the fault common to many modern definitions, of giving an abstract of the main characteristics of the object, rather than a clear guide to distinction.

Dr. Gadow[1] defines Birds as "oviparous, warm-blooded, amniotic Vertebrates, which have their anterior extremities transformed into wings. Metacarpus and fingers carrying feathers or quills. With an intertarsal joint. Not more than four toes, of which the first is the hallux."

Much of this the beginner might well postpone, his attention being solely drawn to the external characters; though of course those that are internal are by no means to be subsequently neglected. Indeed no satisfactory progress can be made in the serious study of Ornithology, or the Science of Birds, without a competent knowledge of their Anatomy and Development; while, though at present comparatively few fossil remains of Birds have been found, some of them are of the highest importance, and there is every probability of future discoveries throwing much light not only on the mutual relationships of Birds among themselves, but also on their connexion with the *Reptilia*. Birds are, in fact, only extremely modified Reptiles, the two Classes forming the *Sauropsida* of Huxley, one of his three primary divisions of Vertebrata.

[1] *P.Z.S.* 1892, p. 236.

The aid of the Palaeontologist and Geologist must thus be called in to clear up many problems which present themselves to the Ornithologist who does not content himself with examining existing forms of life alone. *Archaeopteryx* (p. 23) from the Jurassic System is the oldest Bird known, nor are any other pre-Tertiary forms recorded, save a small number from the rocks of the Cretaceous Epoch, the chief of which are the so-called *Odontornithes*, or toothed species of America (p. 45).

The following paragraphs on the structure of Birds will help to explain the systematic account in the later chapters.

Feathers.—Returning to the outward character denoted by the popular saying with which we began, the Feathers[1] constituting the plumage may not inconveniently be first considered. The general belief that they grow from almost every part of a Bird's body, as do hairs in most Mammals, is erroneous; for, almost without exception, they grow in certain definite tracts called *pterylae*, the intervening spaces, whether they be wholly bare or covered with down, being termed *apteria*. The arrangement of these patches is at times of considerable assistance in determining a Bird's affinities; and the subject may be studied in Nitzsch's *Pterylographie*[2] or in a shorter form in Dr. Gadow's article "Pterylosis" in Professor Newton's *Dictionary of Birds*.

A feather originates thus. A conical papilla arises in the *derma* and pushes up the *epidermis*, a depression forming meanwhile around the base; subsequently the derma supplies a nutritive pulp, while part of the epidermal layer is converted into a tuft of stiff rays, meeting and forming a short tube below; these thereafter burst their covering and protrude as the *rami* or barbs, on which, apparently by secondary splitting, are commonly produced *radii* or barbules. In this state we have a "plumule" or "down-feather"; but in the case of the feathers that have "webs" or "vanes" (*vexilla*), often called contour feathers (*pennae* or *plumae*), a fresh papilla forms at a deeper level, so that the earlier structure is thrust forward and eventually drops off from the apex of the later. Meanwhile the "dorsal" portions of

[1] The integument of a Bird consists of Skin and Feathers, the former being composed of a superficial *epidermis* and an underlying *derma* or *cutis*, which is rich in sensory organs but poor in blood-vessels. The epidermis itself has a horny outer layer and a softer (Malpighian) substratum. Feathers, hairs, bristles, scales, claws and bill-sheaths are epidermal structures.

[2] A translation was edited for the Ray Society by Mr. Sclater in 1867.

the barrel or quill (*calamus* or *scapus*) at the base of the tuft of rays have elongated into a principal shaft (*rhachis*); this is generally accompanied by a secondary "aftershaft" (*hyporhachis*), originating from the "ventral" side, which in the Emeu and Cassowary rivals the shaft itself in size. On the rhachis a double series of *lamellae* or barbs are developed, carrying a similar double series of barbules, much as in the down-feather, but the barbules again give rise to barbicels (*cilia*), which in the distal rows usually terminate in hooklets (*hamuli*). These catch in the folded margins of the next proximal row, and a firm surface is thus secured. An after-shaft never, and a down-feather rarely, possesses barbicels; while in some cases by the absence of these and part of the barbules a "disconnected" web and a "decomposed" feather are formed, as in the decorative tufts of many species. The barbs may even be absent, as in the wing-quills of Cassowaries, the "wires" of Birds of Paradise, the "bristle-feathers" at the gape of Night-jars or the eyelashes of Hornbills. In the hackles of *Gallus* (Fowl), and the secondaries or even the tail-feathers of *Ampelis* (Waxwing), the tip of the rhachis is flattened and wax-like; and similar structures are observable elsewhere. In the newly-hatched young the down is often partly or entirely suppressed, but in certain Birds this suppression is temporary, and a thick coat grows after a few days. "Powder-down" feathers are those which never develop beyond the early stage, and continually disintegrate at the tip into bluish- or greyish-white powder; they occur in the *Tinamidae, Ardeidae, Rhinochetidae, Eurypygidae, Mesitidae, Accipitres* and *Psittaci*, in *Podargus, Coracias, Leptosoma, Gymnoderus* and *Artamus*.

Colour.—The colour of Feathers is due to one of three causes. First, an actual pigment[1] may be present in certain corpuscles, or in diffused solution, and the tint does not then vary according to the incidence of the light. Secondly, it may arise from a pigment overlaid by colourless structures in the form of ridges or imbedded polygonal bodies; here, if the vanes are scraped or held up to the light, the pigmentary colour alone is visible.[2] Thirdly, the colour may be iridescent or prismatic; that is, a blackish pig-

[1] Of this nature are zoomelanin (black), zoonerythrin (red), zooxanthin (yellow), turacin (red—only known in the *Musophagidae*), and perhaps turacoverdin (green, from the same family). Brown is produced by a combination of red and black; white is the appearance due to innumerable air-spaces.

[2] Such are many yellows, oranges, greens and blues.

ment may lie beneath a surface, which, whether polished, ridged, or pitted, acts as a series of prisms, causing the hue to vary according to the relative position of the spectator's eye and the light. This is seen in a remarkable degree in Humming-birds.[1]

Not uncommonly the vanes of feathers have an appearance like watered silk, due to very indistinct transverse striations. In regard to plumage generally, it may be noticed that the markings on a feather frequently indicate the age of a bird. In some the immature plumage is characterised by light-coloured tips to the feathers, which are lost as maturity is reached. In other groups, and especially in most of the *Accipitres* or Diurnal Birds of Prey, the markings of the immature bird are generally longitudinal, and in the adult transverse. In nearly all these cases the change is effected at the first moult. Females and young are usually duller than males, but in some cases, such as *Phalaropus* (*Limicolae*) and *Eclectus* (*Psittaci*), the hen-birds are the more brightly coloured.

Moult.—Referring to p. 2, it should be remarked that, after the production of a feather, the formative substances become for a while dormant, but awake to renewed activity, if accidental or periodical loss needs to be made good; and so we naturally arrive at the phenomena of the annual Moult, which is often "double," that is, occurring towards autumn, and again in spring.

Though some Birds do not lose their quill-feathers the first year, they normally gain a winter plumage—differing in colour from the summer garb—by moulting or shedding their feathers. The wing-quills, and even those of the tail, are ordinarily discarded in pairs, though not quite simultaneously; but most *Anatidae* (Swans, Geese and Ducks), and apparently the *Phoenicopteridae* (Flamingos), lose all the former at once,[2] and with them the power of flight; while in the first-named Family the males of many species assume for several weeks a dress resembling that of the female, and are said to undergo an "eclipse." Young birds moult, as a rule, somewhat later than adults, but in the typical *Gallinae* the original quills are shed before the possessors are fully grown, and are succeeded by others of proportionately increased size, the power of flight being attained very early.

[1] Albinism is due to the absence of pigment; melanism, xanthochroism and erythrism are terms implying an abnormal proportion of black, yellow, or red in the plumage. They may be caused by food.

[2] In some cases at least Rails and Moor-hens do the same.

The additional or spring moult affects the smaller feathers only, while it is still doubtful how far changes of colour are due to a mere dropping off of the fringe of barbicels. The decorative plumes of the males of many species are gained at the vernal moult. The double process is certainly not diagnostic of Families or even Genera, except in isolated cases; as an instance, however, the Larks have one moult, the Pipits and Wagtails two.

In such cases as Swallows and Diurnal Birds of Prey generally, the plumage is not changed till after the migration; in the Ptarmigan there is a triple moult, the breeding-suit being changed first to a greyish habit and then to a white; in Penguins the feathers of the wing come off in apparent flakes.[1]

Skeleton, Digestive Organs, etc.—The plumage, however, though often striking, and of undoubted utility as a non-conductor of heat and a protection against wet, plays a subordinate part in determining the relationships of the larger groups of Birds. For this we need the assistance of anatomy, if indeed we do not rely upon it almost entirely. It will be well before starting to state that structures which are morphologically similar, that is, which have a like origin in the embryo, are termed "homologous," while those which perform the same physiological functions are "analogous," the word in its strictest sense implying initial diversity.

Any standard work on Vertebrate Anatomy ought to furnish a concise account of the bony framework or Skeleton of a Bird, but it will be convenient here to follow mainly the treatment of Dr. Gadow, in Prof. Newton's *Dictionary of Birds*, pp. 848-867.

According to this authority the Axial Skeleton consists of the Skull and Vertebral Column; the Appendicular Skeleton of the Ribs, the Sternum, the Limbs and their Arches, the Hyoid Apparatus or framework of the tongue, and the Jaws.

1. The Vertebral Column, which protects the Spinal Cord, is composed of a variable number of cervical, dorsal, sacral or pelvic, and caudal vertebrae; that is, those of the neck, back, loins and tail respectively. The first cervical vertebra, which bears the head, articulating with it by a single condyle, is called the Atlas; the second, on which it turns, the Axis; the succeeding cervicals

[1] In certain of the *Tetraonidae* the claws are shed in spring; in some *Alcidae* (Auks) the horny bill-sheath and the outgrowths over the eyes are lost after the breeding season; the American White Pelican moults a horny projection on the culmen after nesting, while the beak of Redpolls is much elongated in summer.

present a considerable number of processes or projections, which protect certain blood-vessels, and serve for the attachment of the muscles which turn the flexible neck. The dorsal vertebrae follow, and some not unfrequently coalesce with each other, but this is always so with the sacrals, and in nearly all existing Birds with the terminal portion of the caudals, which are fused together to form a "pygostyle" or upright triangular plate to carry the tail-feathers.[1] *Archaeopteryx*, so far as is known, stands alone in having all the caudal vertebrae free.

A typical vertebra consists of a centrum, and an arch, with articular surfaces for two ribs, and is called heterocoelous when the facets, or connecting surfaces, are saddle-shaped, a condition characteristic of, and restricted to, Birds. It is amphicoelous, or biconcave, when each end is hollowed, as in the dorsal region of *Ichthyornis* and probably in *Archaeopteryx*; procoelous, when concave in front (as is common in Reptiles); opisthocoelous when concave behind (as in many Mammals).

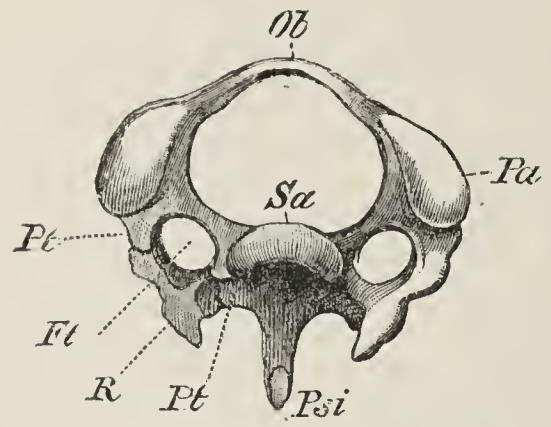

FIG. 1.—Third cervical vertebra of Woodpecker (*Picus viridis*). (Viewed anteriorly.) *Ft*, vertebrarterial foramen; *Ob*, upper arch; *Pa*, articular process; *Psi*, haemal spine; *Pt*, *Pt*, the two bars of the transverse process, shewn on one side ancylosed with the cervical rib (*R*); *Sa*, articular surface of centrum. (From Wiedersheim.)

2. The Ribs are doubly attached to the vertebrae by a head (*capitulum*) and a knob (*tuberculum*); and have a neck, a dorsal, and a ventral portion, each dorsal section (save on the last rib) possessing an "uncinate process" or thin, bony posterior projection, except in *Archaeopteryx* and the *Palamedeidae*. Should the ventral piece articulate with the sternum the rib is "true," otherwise it is called "false"; moreover the cervical and frequently the post-thoracic ribs are fused with the cervical vertebrae and the ilia respectively.

3. The Breast-bone (*Sternum*) presents two different styles—according to whether it exhibits on its ventral surface a median ridge or keel (*carina*), or not. In the former case, which is that of by far the greater number of existing Birds (hence termed *Carinatae*), the keel is of variable size, being correlated with the power of flight. It is exceedingly deep in the Swifts, Humming

[1] The *Ratitae*, *Crypturi* and *Hesperornis* have no pygostyle.

Birds, and certain Petrels, but dwindles almost to disappearance in some flightless forms such as the Dodo, the Kakapo (*Stringops*), the extinct New Zealand Goose (*Cnemiornis*), and a good many Rails. The absence of a keel is characteristic of the other and smaller group of Birds, made up of the Ostrich, Rhea, Emeu and

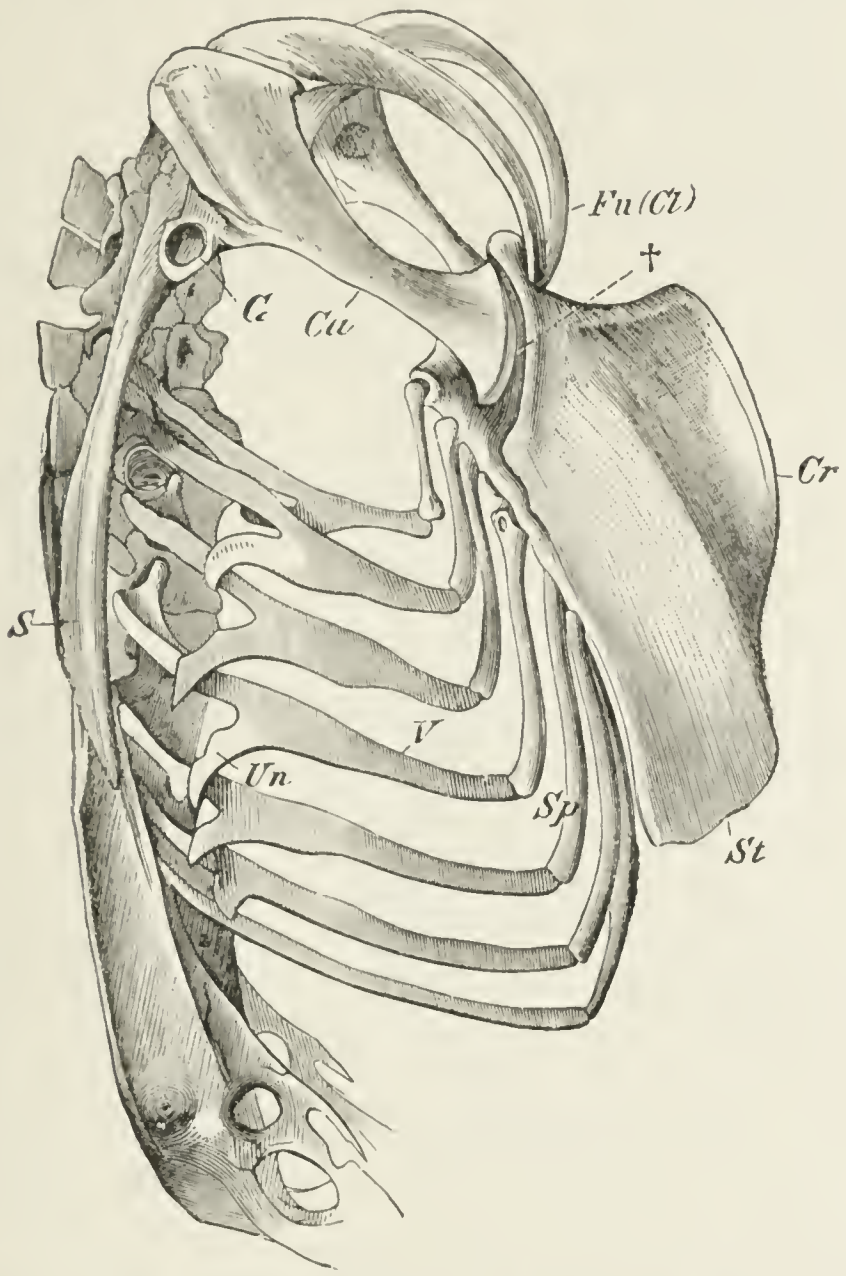

FIG. 2.—Skeleton of the trunk of a Falcon. *Ca*, coracoid, which articulates with the sternum (*St*) at †; *Cr*, keel of sternum; *Fu* (*Cl*), furcula (clavicles); *G*, glenoid cavity for humerus; *S*, scapula; *Un*, uncinate process; *V*, vertebral, and *Sp*, sternal, portion of rib. (From Wiedersheim.)

Cassowary, Moa and Kiwi, which from the resemblance the sternum thus bears to a flat-bottomed boat (*ratis*) are known as *Ratitae*. Whether keeled or not, the breast-bone affords a surface of attachment to the principal muscles of the fore-limbs, and its anterior end supports the coracoids, as in Fig. 2. Various processes are in most cases developed on the sides of the sternum itself, behind its junction with the ribs, especially towards the

posterior portion, where they often take the form of prolongations, the extremities of which occasionally meet and enclose what are called *fenestrae;* but these are unimportant when compared with the features presented by the anterior part.

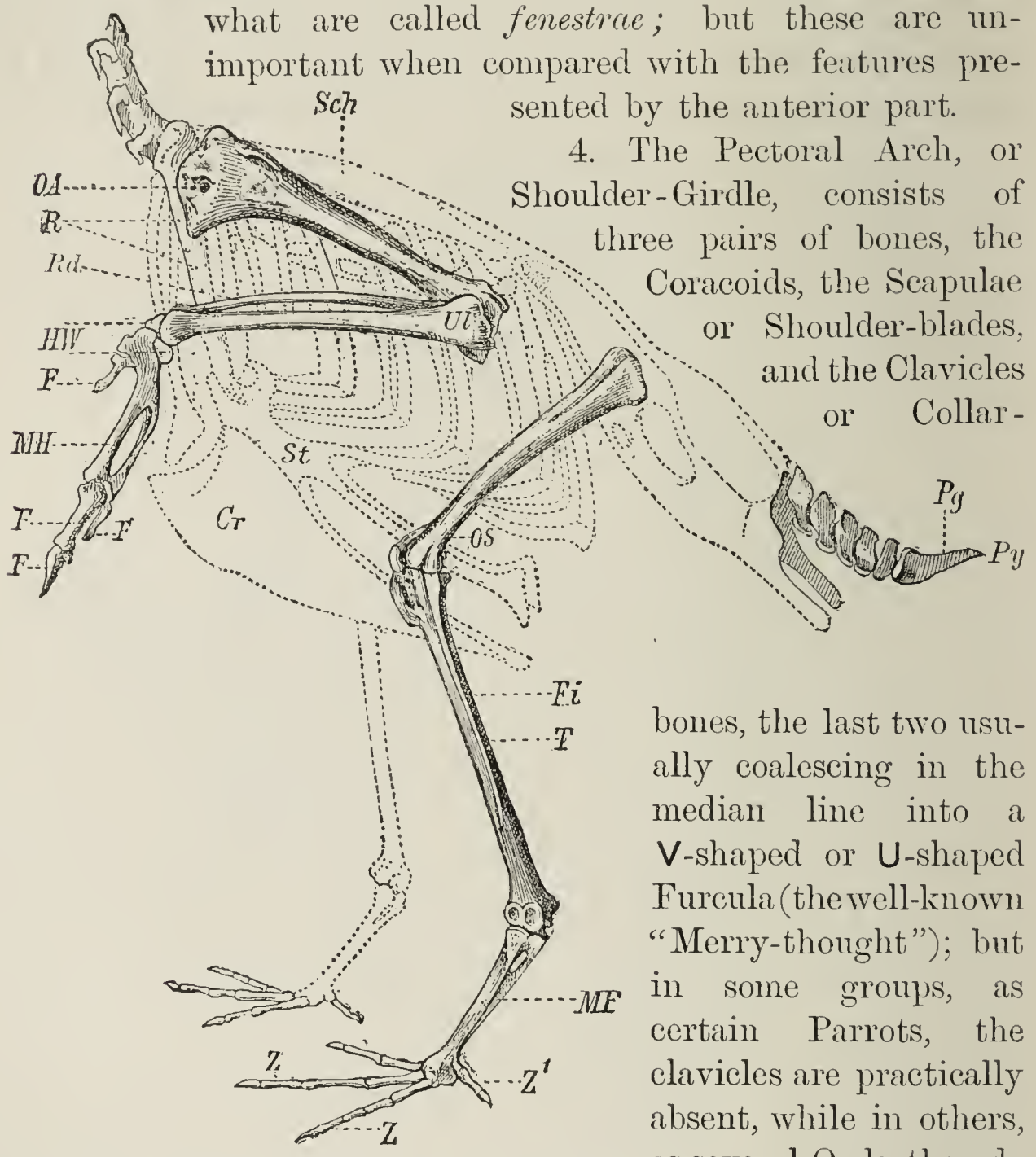

Fig. 3.—Skeleton of the Limbs and Tail of a Carinate Bird. (The skeleton of the body is indicated by dotted lines.) *F*, digits; *Fi*, fibula; *HW*, carpus; *MF*, tarsometatarsus; *MH*, carpometacarpus; *OA*, humerus; *OS*, femur; *Py*, pygostyle; *R*, coracoid; *Ul*, ulna; *Sch*, scapula; *St*, sternum, with its keel (*Cr*); *T*, tibiotarsus; *Rd*, radius; *Z*, Z^1, digits of foot. (From Wiedersheim.)

4. The Pectoral Arch, or Shoulder-Girdle, consists of three pairs of bones, the Coracoids, the Scapulae or Shoulder-blades, and the Clavicles or Collar-bones, the last two usually coalescing in the median line into a V-shaped or U-shaped Furcula (the well-known "Merry-thought"); but in some groups, as certain Parrots, the clavicles are practically absent, while in others, as several Owls, they do not unite. The furcula often ossifies firmly with the anterior portion of the keel, and in *Fregata*, *Didus* and the *Ratitae*, the coracoids and scapulae are fused together.

5. The Anterior Limbs, or Wings, are composed of the Humerus, or upper arm-bone, the Ulna and Radius (making the fore-arm), the Carpus or wrist, the Metacarpus and Digits, corresponding with the hand and fingers. The first of the three metacarpals bears the Pollex, or thumb, with one or two

phalanges (joints); the second the Index, representing man's first finger, with two or three joints; the third a weak digit with only one phalanx, except in *Archaeopteryx*, where there are four. The *Casuarii* and *Apteryges* possess an index only, which in the *Sphenisci* is fused with the pollex. The basal joint of this is the normal place of attachment of the "bastard wing" (*alula spuria*). *Archaeopteryx* had claws on all its fingers, but in recent Birds they occur on the first two only, being functionless in the adult. Wing-spurs arise from the carpal and metacarpal bones.

6. The Pelvic Arch consists of the Ilium, Ischium, and Os pubis, these three paired bones meeting from each side at the cup (*acetabulum*) that receives the head of the femur, and coalescing early in life; while the *incisura ischiadica* or notch between the

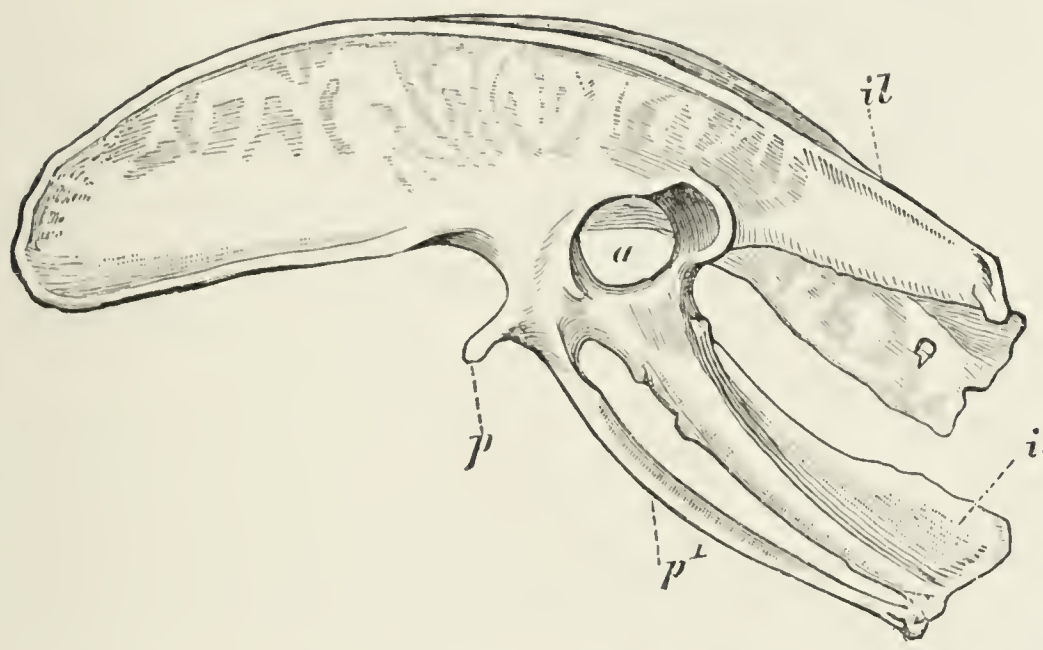

FIG. 4.—Pelvis of *Apteryx australis*. Lateral view. *a*, Acetabulum; *il*, ilium; *is*, ischium; *p*, pectineal process of pubis; p^1, pubis. (From Wiedersheim, after Marsh.)

ischium and the ilium becomes an inclosed space (*foramen*) in all Birds except the *Ratitae* and *Crypturi*.

7. The Posterior Limbs, or Legs, are composed of the Femur or thigh, the Tibia and Fibula, making the shank or "drum-stick," and the bones of the Foot. The thigh, however, being hidden by the plumage, the shank of a Bird might easily be taken for the thigh, and the metatarsus (the cannon-bone of some) for the shank. The tibia and fibula commonly unite to some extent, and the former, as it now exists in adult Birds, is strictly a "tibio-tarsus," since with it is fused the proximal portion of the originally existing tarsal elements. Similarly the distal tarsal

elements unite with the metatarsus, which is therefore properly a "tarso-metatarsus," though often called merely "tarsus" by ornithologists. This arises from a fusion of the second, third, and fourth metatarsal bones, which in the adult (except among the *Sphenisci* and to some extent in *Psittaci*) do not lie in the same plane; the middle one having its upper end thrust backward and its lower end forward in the course of growth to maturity. The fifth metatarsal practically disappears, while the first remains more or less separate, and lies behind the distal portion of the other metatarsals.

Of the toes the fifth is not traceable in Birds; the first is often aborted, but the second only in *Struthio*, and to a less extent in *Ceyx* and *Alcyone*, and the fourth (nearly) in *Cholornis*. The hallux, or hind toe, has two phalanges, the second digit three, the third four, and the fourth five; *Cypselus* and *Panyptila* (Swifts), however, are exceptions, and possess only three in each of the anterior toes, while the *Caprimulginæ* (true Nightjars) and *Pteroclidae* (Sand-Grouse) have only four joints on the outer. In Owls and *Pandion* the fourth digit is reversible at will, the same being true to a less extent of the *Musophagidae* (Plantain-eaters) and *Leptosoma* (akin to the Roller); when this condition is permanent, as in the *Cuculidae*, *Psittaci* and *Pici* the foot is termed zygodactylous. In *Trogones* the second toe is reversed (heterodactylous). *Colius* can turn the first toe forward and the fourth backward, while certain Swifts, and to a less degree some Nightjars, have the whole number permanently pointing to the front (pamprodactylous). Membranes more or less connecting the anterior digits produce a webbed or swimming foot, even the hallux being united with the rest in the *Steganopodes*. The hind-toe is often elevated, or higher than its fellows, when it is commonly reduced and sometimes lacks a nail. The Ostrich has little or no claw on the outer toe, while that of the third toe is toothed or serrated in a considerable number of Birds, but this is a character of very slight importance.

The covering of the metatarsus is usually "scutellated," but when the *scutellæ*, or scales, which may be oblong or polygonal, are smaller than usual—and generally hexagonal—it is called "reticulated." In some cases the surface becomes nearly or quite smooth ("ocreated" or "booted"), or more or less granulated.

8. The structure of the Skull is a study in itself and affords

considerable help in Taxonomy (Classification). It must suffice here to refer for the names of the parts to the subjoined figure.

The Bill, or Beak, is composed of an upper jaw or maxilla, and an under jaw or mandible. From the figure it will be seen that "maxilla" is not strictly the whole upper portion, though the term is thus used for convenience, as is the plural "mandibles" for the two jaws when mentioned simultaneously. The "rhamphotheca," or horny sheath, may be simple (undivided), or compound, that is, made of several distinct pieces. In the *Anseres* the covering is soft with a horny (corneous) tip or "nail"; in

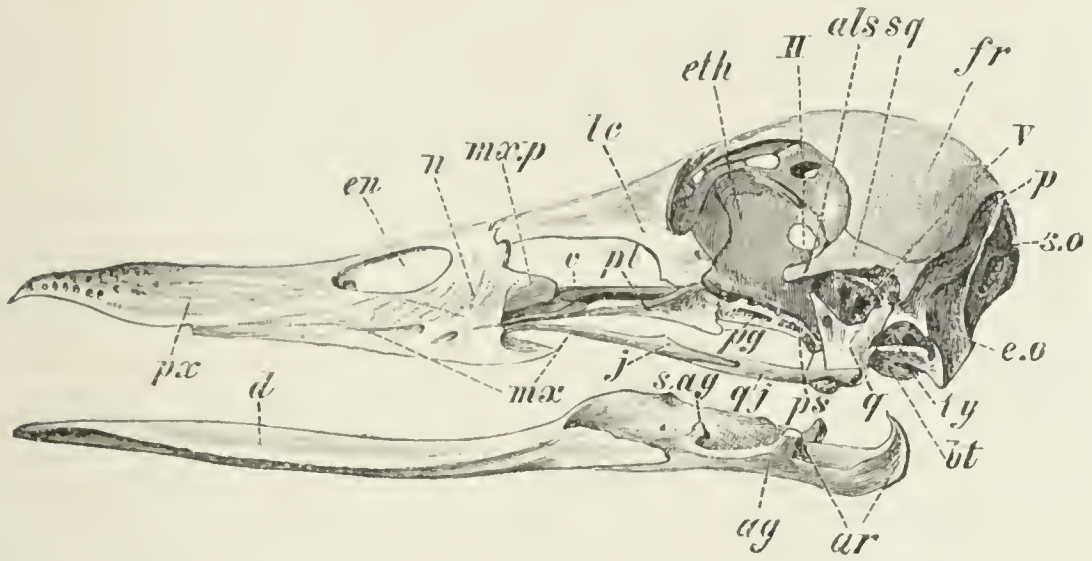

FIG. 5.—Skull of a Wild Duck (*Anas boscas*), from the side. *ag*, Angular; *als*, alisphenoid; *ar*, articular; *bt*, basitemporal; *d*, dentary; *en*, external nostrils; *e.o*, exoccipital; *eth*, ethmoid; *fr*, frontal; *j*, jugal; *lc*, lacrymal; *mx*, maxilla; *mx.p*, maxillopalatine process; *n*, nasal; *p*, parietal; *pg*, pterygoid; *pl*, palatine; *ps*, presphenoid; *px*, premaxilla; *q*, quadrate; *q.j*, quadratojugal; *s.ag*, supra-angular; *s.o*, supraoccipital; *sq*, squamosal; *ty*, tympanic cavity; *v*, vomer; *II*, foramen for optic nerve; *V*, for trigeminal. (From Wiedersheim, after Parker.)

the *Limicolae* it varies extremely, producing a hard pickaxe, as in the Oystercatcher, or a delicate sensory organ as in the Snipe and Woodcock. The rhamphotheca at times has extraordinary outgrowths, as in the Hornbills, Sheathbills, and elsewhere. In the *Accipitres*, or Diurnal Birds of Prey, and most *Psittaci*, the base is soft and becomes a "cere," while the similar formation in the *Columbae* is due to a swelling of the *operculum* or covering of the nostrils. This operculum, moreover, may be leathery (coriaceous), as in the *Charadriidae*, *Trochilidae* and so forth, or rolled up, as in *Rhinochetus*; it may even result in a short soft tube, as in *Caprimulgus*, or in the hard double tube which gives the name of *Tubinares* to the Petrels. "Impervious" nostrils are those with a septum, or division, between the nasal cavities, "pervious"

those with none. The narrow slit-like or entirely closed nostrils of the *Steganopodes* should also be mentioned.

The form of the bill varies from the "spoon" of *Platalea* and *Eurynorhynchus* (spatulate) to the "arch" of *Numenius*, the "scissors" of *Rhynchops*, the "wedge" of *Picus*, the big rounded feature of the *Psittaci*, and so forth; but for details the characters of the several Families must be consulted, as also for helmets, shields, horns, knobs, and peculiarities due to the elongation, distorting or crossing of the mandibles. These, too, are often notched, serrated, lobed or "festooned," or emarginate (slightly indented); the curious transverse serrations or *lamellae* of the beak in *Anseres*, and the somewhat similar sifting apparatus in *Phoenicopterus*, *Prion* and *Anastomus* being especially remarkable. Teeth were probably lost by Birds before Tertiary times, but were possessed at least by *Archaeopteryx*, *Hesperornis* and *Ichthyornis*. The so-called "egg-tooth" of embryos is merely a calcareous protuberance on the upper surface of the bill, which is cast after being used to crack the shell.

9. The organs of deglutition and digestion begin with the tongue, which is subject to much variation of structure, according to the different groups of Birds, and is of course correlative with their habits. It has little connexion with taste, though often of assistance in obtaining nutriment. To this follows the gullet (*oesophagus*), which in many cases has an enlargement forming the crop (*ingluvies*), wherein the food may be temporarily retained before passing into the stomach, the last-named always having an antechamber (*proventriculus*) where digestion is largely accomplished, in front of the gizzard (*ventriculus*). This has frequently strong muscular walls, and its action is often assisted by the mechanical process of comminution performed by stones, grit or sand, swallowed for that purpose. The stomach is succeeded by the intestines, which in most cases have a pair of blind-sacs (*caeca*) attached to them, often acting as aids to digestion, though these are not always functional, and are absent in many Birds, while in others they attain a very large size, their condition being in consequence of some importance as a systematic character.

10. The organs of voice in Birds have long attracted special interest from the loud cries which some utter, and the melody with which others are gifted. Setting aside the part played by

the *trachea* or windpipe in supplying air to the lungs, its formation is worthy of attention. Its upper end consists of the *larynx*, and it passes down the neck as a flexible tube, formed by a continuous succession of bony rings connected by membrane, until it bifurcates into two *bronchi*, which open into the lungs. A common feature, found in many groups not nearly allied, is the dilatation of a portion, generally near the middle, while a remarkable modification is exhibited by the males of many of the Duck-tribe, some of the lowest rings being fused together and forming what is known as the *bulla ossea* or "labyrinth." In other *Anatidae* (some of the Swans), and some of the Cranes, the trachea enters the keel of the sternum; but a not unfrequent modification, usually confined to the male sex, often occurs elsewhere, when the windpipe is looped back upon itself. All these arrangements, however they may affect the sounds uttered by Birds, do not in themselves constitute the voice organ of most. That is reserved for the *syrinx*, a peculiarity of the Class *Aves*, consisting of the lower end of the trachea and the adjoining part of the bronchial tubes; and the varied modulations are effected by means of muscles attached thereto. These voice-muscles may be wholly absent or of the simplest character, but they attain their highest perfection in the *Passeres*, and especially in the large group of them known as *Oscines*, where there are often five or seven pairs. In this group the lowest four or five tracheal rings are solidly fused into a little bony box communicating with the bronchi; the first and second bronchial rings (or in this part often semi-rings) being closely attached to the trachea, and the spaces between the second and third and the third and fourth being generally closed by an outer typaniform (drum-like) membrane, while the rest of the semi-rings of the bronchi are closed by the inner tympaniform membrane. It should be clearly understood that all the notes emitted by Birds are produced by the above structures only, and that the tongue has nothing to do with their utterance, except, possibly, in the case of the sounds that Parrots (but not other birds) are taught to produce.

Classification.—The Classification of Birds is still in a condition of uncertainty, notwithstanding the many schemes successively propounded during more than two centuries. To dwell upon them here would be impossible, and it is only practicable

to trace in the briefest way the line which has led to the most recent attempts, and to name those whose researches have produced the results which may be fairly regarded as attained. First among them is Nitzsch (1806-1840), to whom followed Merrem (1812-1817), and after a few years L'Herminier (1827). These three worked quite independently, and in their lifetime little notice was taken of their labours; for, though there were good ornithologists among their contemporaries, little value was then set upon internal characters in this connexion. An improvement took place when the great Johannes Müller (1846, 1847) published his scheme for grouping the *Passeres*, which, though based on purely anatomical facts, was almost immediately accepted, chiefly through the simultaneous exertions of Dr. Cabanis, by systematists of the Old School. For twenty years no advance was made, for the morphological researches of Parker were not directly taxonomical; but Huxley (1867, 1868) started what was practically a new line of investigation, though it subsequently appeared that up to a certain point it had been already suggested by Dr. Cornay (1842-1847). The impetus thus given was fortunately sustained, Huxley's example being followed by Dr. Murie, and by two promising men, A. Garrod and W. A. Forbes, both of whom died at an early age, leaving their mark in work which, though much of it was crude, was that of true genius. Mr. Sclater (1880) has tried to bring the results of the whole four into harmony with pre-existing views, and a similar attempt was that of Dr. Stejneger (1885); but all were overshadowed by the monumental performance of Prof. Fürbringer, whose *Untersuchungen zur Morphologie und Systematik der Vögel*, completed in 1888, must ever remain a record of unexampled labour, while his considerations on the derivation of Birds from Reptiles, and of the later groups of Birds from the earlier, whether his results be right or wrong, are of the utmost importance to the ornithologist. During the progress of this work the author was in frequent communication with Dr. Gadow, himself engaged on the ornithological portion of Bronn's *Thier-Reich*, and thus the opinions of each were in many cases mutually affected. Dr. Gadow, on the completion of his undertaking, propounded a scheme of classification, which is followed, with some slight modifications, in the present volume (see foregoing table) —it being, of course, understood that a linear arrangement is,

strictly speaking, impossible, since any group may have a decided affinity to more than two others. This Classification, beginning (as Birds themselves must have begun) with the lower forms, takes us, except in the *Oscines*, as far as the Families, which in most cases are fairly distinguïshable, though of very variable value. Coming to Genera, and still more to Species, the opinions of authorities often differ so widely, that at present an attempt to reconcile them is hopeless. It cannot be denied that Genera and Species are merely "convenient bundles," and that divisions of either, if carried too far, defeat the object for which Classification is intended. Genera are only more distinct from Species, and Species from Races, because the intervening links have disappeared; and, if we could have before us the complete series which, according to the doctrine of Evolution, has at some time existed, neither Genus nor Species would be capable of definition, any more than are Races in many cases; while the same remark will apply to the larger groups.

From these Races or Geographical variations we may not unnaturally turn to **Geographical Distribution.** It will always be credited to Ornithology that the interesting study of the Geographical Distribution of Animals was first placed on a scientific basis as a result of the study of Birds. This was effected by Mr. Sclater, whose division of the Globe into Six "Regions"—the *Palaearctic, Ethiopian, Indian,* and *Australian,* forming one group—the "Old World" (*Palaeogaea*); and the *Nearctic* and *Neotropical,* forming a second—the "New World" (*Neogaea*); was announced in 1858 (*J. Linn. Soc.* ii. pp. 130-145). His scheme, being solely grounded on Ornithological considerations, was accepted with scarcely any modification by Mr. Wallace in his great work (*Geograph. Distrib. of Animals,* 1876), and by the majority of zoologists, though some demurred, and among them Huxley, who, in especial reference to Birds, shewed (*Proc. Zool. Soc.* 1868, pp. 313-319) that there was more reason to divide the earth's surface latitudinally than longitudinally, and that Four Regions were better than Six—these four being (1) *Arctogaea,* comprising Mr. Sclater's Indian, Ethiopian, Palaearctic, and Nearctic; (2) Austro-Columbia, corresponding with the Neotropical; (3) Australasia; and (4) New Zealand—the last three being combined as *Notogaea.* In 1882 Prof. Heilprin proposed to unite Mr. Sclater's Palaearctic and Nearctic under

the name of Triarctic; but in the next year (*Nature*, xxvii. p. 606) adopted for that union Prof. Newton's earlier term Holarctic. Some other general schemes have been promulgated, as those of M. Trouessart and Professor Möbius; but they have found little support, and with regard to the Class *Aves*, though certainly not with regard to other groups as *Pisces*, or *Mollusca*, what is practically the scheme of Mr. Sclater has met with acceptance, whether with or without the modifications proposed by Huxley and Professor Newton, there being really but two important points of difference—(1) the recognition of New Zealand as a distinct Region, and (2) the union of the Nearctic and Palaearctic areas into a single Region. It would be impossible here to set forth the arguments by which these views are maintained or contested, and it must suffice to trace briefly the outlines of the several districts. *New Zealand*, if admitted as a distinct Region, consists only of the islands so named, the smaller Chatham, Auckland, and Macquarrie groups, Antipodes Island, Lord Howe, Norfolk and Kermadec Islands. The *Australian*, if the preceding be cut off, will include Tasmania, all Australia, and the islands to the northward as far as what has been called "Wallace's Line" (between Lombok and Bali), Celebes, New Guinea, New Britain, and all the countless groups of tropical islands in the Pacific Ocean—except the Galápagos, which undoubtedly belong to the next Region. The *Neotropical* is made up of all South America, the Antilles and Central America, the only doubt being whether to draw the northern boundary so as to exclude or include Mexico, or even the southern part of the United States. To this naturally succeeds, but with an indefinite southern boundary, the *Nearctic*, comprising the whole of the rest of North America to the shores of the Polar Sea, with the addition of Greenland. Its north-western corner, Alaska, is now known to be largely tenanted by forms from Asia, not found elsewhere in America, and this is one of the chief reasons assigned for uniting it with the *Palaearctic* area, which may be taken to include Japan and all continental Asia to the north of China proper, the Himalayas, the Persian Gulf and the east end of the Mediterranean. Some authorities would add Northern Arabia and Lower Egypt; but all have agreed to include Tunis and the ancient Mauritania—the Barbary States lying north of the Great Desert to the Atlantic Ocean about Mogador, as well as the Canaries, Madeira and the Azores, with the whole of Europe

from Greece to Iceland. What is left of Arabia and Africa, after taking off the above portions, with the addition of Madagascar and the Mascarene Islands, is the *Ethiopian* Region; and all the rest of continental Asia, with the islands not included in the Australian Region, becomes the *Indian*, or, as it has lately been called, the *Oriental*. It would be quite impossible to enumerate here the various Sub-regions and Provinces into which these several Regions may be divided. The views of Mr. Wallace are set forth at length in his excellent work, those of Mr. Sclater in *The Ibis* for 1891, pp. 514-557, and those of Professor Newton in his *Dictionary of Birds*. Many writers would assign to Madagascar a higher rank than that of a Sub-region.

Migration.—Few peculiarities of Birds have excited more general interest than their seasonal Migration, which in many species is so marked as to have been observed from very remote times; and it is probable that nearly all species are subject to periodical movements of varying extent. These movements are greatest in the Birds which have their breeding quarters in the northern parts of the Northern Hemisphere; and, with some exceptions, it may be said that the more northerly is the range of a species the more extensive are its migratory wanderings. In the Southern Hemisphere the facts known are as yet insufficient to allow of safe deductions. Absence of a food-supply in winter is alone enough to account for migration in the above cases, and the return from the south in spring is probably due to the desire of Birds to reoccupy their old haunts, or those in which they have been bred. But just as there are some species which habitually breed within the Arctic Circle and winter in the Tropics, there are others which may not go so far in either direction, and yet have their movements governed by exactly the same principle, with the result that in a temperate zone we have Birds coming from the north to winter with us, while others, arriving from the south in spring, spend the summer here, and depart towards autumn. Others again, the true "Birds of Passage," arriving like the last in spring, make little or no stay, but pass onward to more northerly lands, and re-appear for as short a time in autumn on their return journey southwards. Moreover, observation shews that, in most parts of the temperate zone, there are many Birds which, though *resident as species, are migratory as individuals*—that is to say, that while examples of

the species may be met with at certain spots throughout the whole year, those which occur at one season are not always the same individuals as those which occur at another—the particular Thrush, Titmouse, or Finch, appearing in the winter not being identical with that which appears in summer. Again, among species of which some individuals are constantly present throughout the year, a great accession to the numbers is made at the close of the breeding-season by the influx of other individuals of the same species bred in another district, though this influx generally lasts for a comparatively short time, and the strangers pass on, accompanied it may be, by some or even most of those that have been reared on the spot in the season immediately preceding. These species are the "Partial Migrants."

It would at first seem from the above that the annual migratory movement would be in a direction due north and south, or south and north, according to season, and so in a general way it is; but there is no doubt that this simple movement is disturbed by many causes, chief among which is possibly the configuration of the land, which is found to give rise to considerable deviations, and that to an extent which is at present very imperfectly understood. It may be considered proved that the trend of a coast-line, the course of a great river, or the intervention of a chain of mountains, has a very appreciable effect on the direction taken by migrating Birds; but not one of these, nor all in combination, affords a sufficient explanation of all the deflexions, and will certainly not account for at least one remarkable fact, as it may now be regarded—the tendency of many Birds in Eastern Europe and part of Siberia to travel westward towards the close of summer or in autumn. This is shewn in several ways, but in none better than by the almost yearly occurrence in Britain at that season of examples of species which breed only in the Russian Empire. For, admitting that such examples are stray wanderers, which have lost their course, their appearance here is still useful in indicating the existence of the westward movement; and, with the evidence they furnish before us, we may judge whence come vast numbers of others—Starlings, Crows, Rooks, Jays, Larks, and what not, whose origin and starting-point it would be otherwise hard to trace or even surmise. Much has been written, especially in Europe, on so-called "Lines of Flight," but as yet to little purpose, and indeed

scarcely any writers on the subject have had sufficient *data* to form an hypothesis, so that it is not suprising that hardly any two agree in theory.[1] In other parts of the world there is still less ground for theorising, though in North America many valuable observations have been made; and these, in conjunction with those carried on in Europe, will no doubt in due time lead to satisfactory results as regards the Northern Hemisphere. Concerning the Southern our ignorance is almost complete.

Of the way in which Migration is performed there is still much to learn—but one thing is certain, all Birds do not migrate in the same manner. Some gather in flocks, great or small, others seem to accomplish their northward journey in pairs, or at any-rate arrive at their breeding-quarters already paired. Some undoubtedly voyage by night, others may be seen to travel by day. Of the Birds which in spring arrive unpaired, it is now incontestable that the males outstrip or precede the females. There is, moreover, equal diversity in the southward movements towards the close of summer and all through the autumn. Of some species the earlier broods disappear without attracting attention, and the later broods as well as the parents slip away almost as imperceptibly. In one remarkable case, that of the Cuckoo, the adults leave this country long before the young are fit to follow; but, in by far the greater number, the young start first, and are followed, often at an interval of some weeks, by their parents.[2] It is contended by many that of actual Migration we see very little, since it is constantly carried on at a height where the Birds are beyond our ordinary observation, and as regards some species this seems to be true. Moreover, it would seem that the longest flights are performed by night, and when the sky is clear, so that only in thick weather do the Birds come near enough to the earth to be heard—seeing them being of course impossible in the dark, though in a few cases they have been telescopically observed passing across the face of the moon. It is certain that many of the smaller land-birds gradually press

[1] For the best collection of facts, see the various reports of the Migration Committee of the British Association, 1880-1888; and especially that for 1896, containing the Digest of the observations (made at Lighthouses and Lightships) by Mr. W. Eagle Clarke. Also Mr. Barrington's work on Migration in Ireland (1900).

[2] It has been suggested that these flocks of young birds are led by older members of their own species which, though for some cause not breeding, have yet had experience of migration; but of this there is no evidence whatever.

onwards prior to leaving our shores, but after that they may possibly betake themselves aloft to continue their journey.

The speed at which Birds travel during Migration is a matter on which very diverse opinions have been and are held; but the highest estimates, such as those of the late Herr Gätke (who

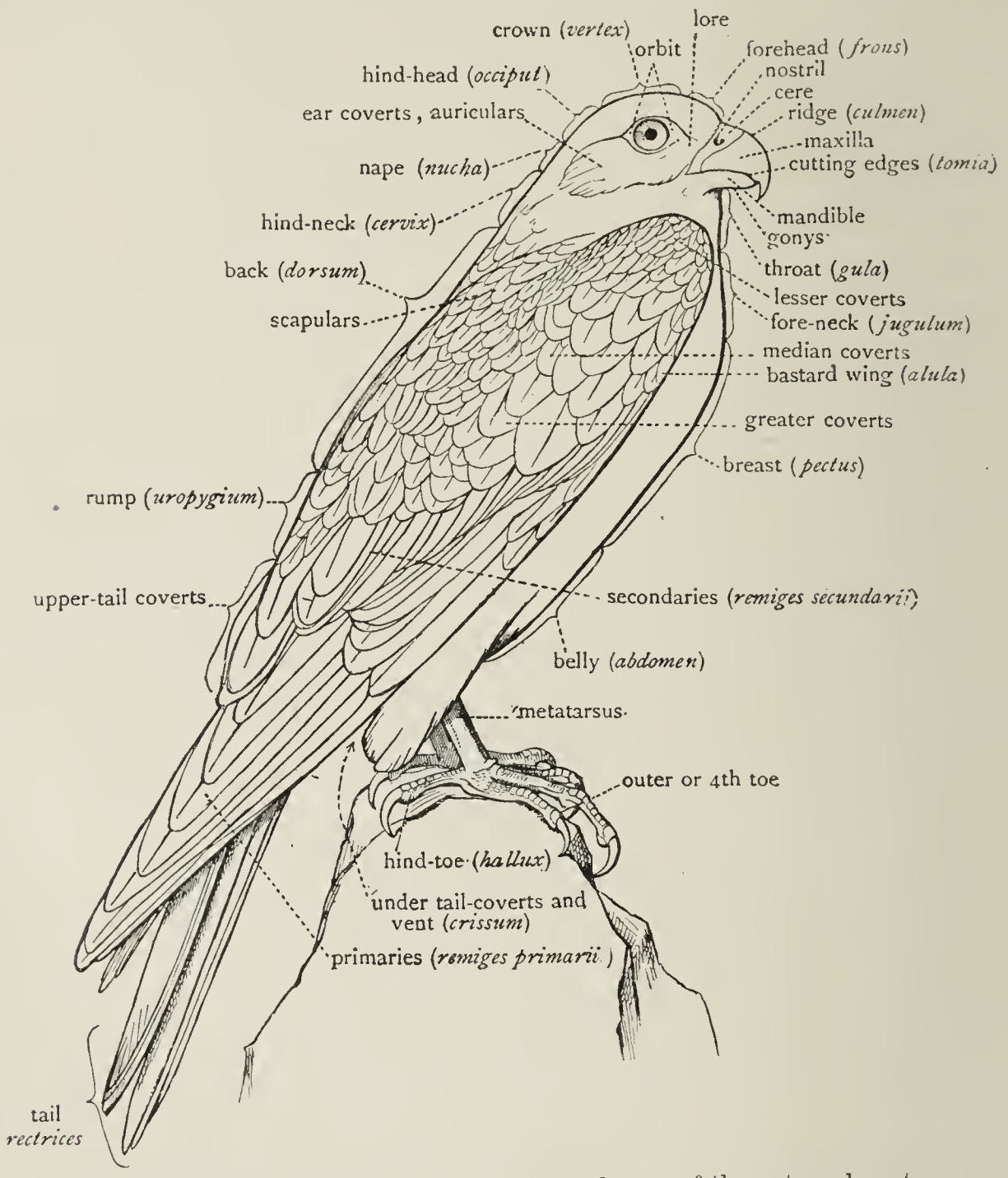

FIG. 6.—A Falcon. To shew the nomenclature of the external parts.

would allow even 150 miles an hour), can scarcely be otherwise than exaggerations; for there is no evidence of any but exceptional performances at such rates, and there is really no reason to suppose that Birds can fly faster at a higher elevation than at a lower.

Terminology.—The annexed figure explains the nomenclature of most of the outward parts of a Bird, but some further explanations may be given, as below:—

Air-sacs.—Membranous receptacles, filled with air, in communication with the respiratory organs or passages. Pouches are often exaggerated air-sacs.

Alar bar.—A coloured bar across the wing (*ala*).

Allantois.—A vascular sack, growing from the hind-gut of the embryo and enclosed by the amnion; the two fuse together and form the Chorion, which lines the egg-shell, and takes upon itself respiratory functions.

Altrices or *Nidicolae.*—Nestlings which, being hatched in a helpless condition, are fed by their parents or inhabit the nest for a considerable time.

Amnion.—A membrane which grows in the developing egg from the ends and sides of the embryonic area, and encloses the embryo at an early period.

Bronchi (p. 13).

Bronchial syrinx.—One in which outer tympaniform membranes exist between two or more successive bronchial semi-rings, while an inner tympaniform membrane may also be present. In typical cases the trachea has no sounding membranes.

Chest.—The same as the upper breast or base of fore-neck.

Chorion.—See *Allantois.*

Compressed.—Used of lateral compression as opposed to vertical (depressed).

Coverts (tectrices).—Feathers that cover the base of the quills (*Remiges*, oar-feathers) of the wing and of the tail (*Rectrices*, steering-feathers). The wing exhibits several series above and below (greater, median, and lesser). Unless otherwise specified, "coverts" in the text refer to upper coverts.

Cubitals.—See *Secondaries.*

Cuneate.—Wedge-shaped.

Decomposed (p. 3).

Depressed.—See *Compressed.*

Distal.—That end of any part or member which is furthest from the imaginary centre or axis of the body.

Dorsal.—The upper side of the body; and hence applied to the corresponding surface of any part or parts of the structure.

Filoplumes.—Filamentous or hair-like feathers.

Flanks.—The portion of the sides near the leg.

Graduated.—Used of the tail when its feathers diminish in length gradually.

Hackles.—Elongated and pointed feathers, as on the neck of Fowls.

Heterodactylous (p. 10).

Hyoid Apparatus.—The bony and cartilaginous framework of the tongue.

Hypocleidium.—A projecting median process at the junction (*symphysis*) of the clavicles.

Lanceolate.—Used of the tongue and the feathers when pointed and lengthened.

Lore.—The space between the bill and the eye.

Mantle.—The feathers of the upper back combined with the upper wing-coverts.

Manuals.—See *Primaries.*

Nidicolae.—See *Altrices.*

Nidifugae.—See *Praecoces.*

Oil-glands.—Secretory organs near the root of the tail, probably used in oiling the plumage. Some exhibit tufts of feathers, others are naked.

Operculum (p. 11).

Pamprodactylous (p. 10).

Patella.—The knee-cap.

Pouches.—See *Air-sacs.*

Powder-down patches.—Groups of powder-down feathers (p. 3).

Praecoces or *Nidifugae.*—Nestlings which are hatched in a condition that enables them almost immediately to leave the nest and feed themselves.

Primaries or *Manuals.*—Those wing-quills (*Remiges*), varying from ten to twelve, borne by the *manus* or hand. They should properly be counted outwards from the *carpus* or wrist.

Procnemial.—In front of the knee.

Proximal.—That end of any part or member which is nearest to the imaginary centre or axis of the body.

Racquet-shaped.—Used of feathers with bare shafts and roundish terminal vanes.

Rectrices and *Remiges.*—See *Coverts*, *Primaries* and *Secondaries.* The *Rectrices* usually number twelve, but vary from four to twenty-eight.

Reticulated (p. 10).

Rictal.—Belonging to the gape.

Roofed.—See *Vaulted.*

Sagittate.—Used of the tongue, and meaning arrow-shaped.

Scapulars.—The feathers lying along the *scapulae* or shoulder-blades.

Scutellated (p. 10).

Secondaries or *Cubitals.*—Those wing-quills (*Remiges*) borne by the *Ulna*, which often exhibits roughnesses where they grow. They should properly be counted inwards from the wrist, and vary from six to thirty or more.

Spatulate.—Spoon-shaped. Used of the bill or of racquet-shaped feathers.

Speculum.—Strictly applied to a band across the wing, more or less metallic in colour, which occurs in the Duck-tribe.

Square.—Used of the tail when level at the end.

Syrinx (p. 13).

Tectrices.—See *Coverts.*

Tertials.—A mistaken word for the inner secondaries.

Thighs.—Loosely used in describing plumage to indicate the feathers falling over the leg.

Trachea (p. 13).

Tracheal syrinx.—One in which the lower portion of the trachea consists of thin membranaceous walls, about six of the rings being thin or deficient. Both inner and outer tympaniform membranes exist in the bronchi, as well as some vibratory tracheal membranes. The few muscles, generally but one pair, are wholly lateral.

Tracheo-bronchial syrinx (the normal form).—One which has this essential feature, that the proximal end of the inner tympaniform membrane, forming the median wall of each bronchial tube, is attached to the last pair of tracheal rings.

Vaulted or *Roofed.*—Used of the tail when compressed like that of a Fowl.

Ventral.—The lower side of the body, in which lie the heart, lungs and digestive organs; and hence applied to the corresponding surface of any part or parts of the structure.

Zygodactylous (p. 10).

CHAPTER II

ARCHAEORNITHES—NEORNITHES RATITAE—NEORNITHES ODONTOLCAE.

The Class **AVES** is divided by Dr. Gadow (Bronn's *Klassen und Ordnungen des Thier-Reichs, Aves, Systemat. Theil*, p. 299) into two Sub-Classes of like value, *ARCHAEORNITHES* and *NEORNITHES*, though some writers prefer to consider the former as of equal rank only to the several subdivisions of the latter here adopted, namely, **Ratitae, Odontolcae,** and **Carinatae** (p. 25). The question is clearly one of degree, and depends entirely on the amount of weight assigned to the various points of distinction to be mentioned below.

The Sub-Class *ARCHAEORNITHES* is at present represented by but one member, the first undoubted fossil Bird, made known in 1861 by Andreas Wagner from the Jurassic slate formation of Solenhofen in Bavaria, and now preserved in the British Museum. This he described under the name of *Griphosaurus;* but as Hermann von Meyer had already bestowed the title of *Archaeopteryx lithographica* upon a bird, presumably identical, a feather of which had been obtained from the above system, the latter appellation has a prior claim. In 1877 a second example, now at Berlin, was procured from the same beds,[1] since which date Meyer's specific name has become firmly established, in place of that of *macrura* given by Owen to Wagner's specimen.

This very remarkable animal, about the size of a Rook, is without doubt a connecting link between Reptiles and Birds; but zoologists are practically unanimous in regarding it as an Avine form, with Reptilian affinities and probably arboreal habits.

The sternum was possibly furnished with a weak keel, the strong wide furcula was U-shaped, the ribs had no uncinate processes, while in all probability the coracoid and scapula made

[1] Cf. W. Dames, *Pal. Abhandl.* ii. 1884, pp. 119-196; transl. *Geol. Mag.* 1884, pp. 418-424; Vogt, *Ibis*, 1880, pp. 434-456; Hurst, *Nat. Sci.* vi. 1895, pp. 112-122, 180-186, 244-248; Pycraft, *op. cit.* v. 1894, pp. 350-360, 437-448; viii. 1896, pp. 261-266.

a right, or even an acute, angle at their junction, and the *centra* of the vertebrae of the neck and back were biconcave. The bill was short and blunt, each side of the upper jaw possessing about thirteen teeth, of which six seem to have belonged to the prae-

FIG. 7.—*Archaeopteryx lithographica*. The Berlin specimen. (After Dames.)

maxilla; whereas in each side of the lower jaw only three can be recognised, and those towards the anterior extremity. These teeth, conical in shape and of fairly equal size, were fixed in a regular row, in distinct sockets. The fibula and tibia did not coalesce, the latter exceeding the metatarsus in length; the toes were four

in number, with two, three, four, and five phalanges respectively, ending in claws, the hallux being directed backwards. The manus had three free digits, and apparently three free metacarpals: the pollex consisted of two joints, the index of three and the third finger of four, while each had a strong hooked claw at the tip. The hand was furnished with six or seven well-developed primaries, attached to the third metacarpal and the second and third digits, the number of secondaries being ten. The long Lizard-like tail had no terminal pygostyle, but was composed of about twenty-one free post-sacral vertebrae, of which the first twelve each bore a pair of large feathers, similar to those of the wing, with the inner webs broader than the outer, and with decided shafts.[1]

The Sub-Class *NEORNITHES* may be arranged, as above stated, in three divisions, (A) **Neornithes Ratitae,** (B) **Neornithes Odontolcae,** and (C) **Neornithes Carinatae.** The first of these contains the Ratite Birds proper and possibly part of the so-called *STEREORNITHES* of Patagonia (p. 43), with several fossil forms of doubtful position from England, France, and New Mexico, as will be seen below; the second the *HESPERORNITHES* of the Cretaceous Shales of Kansas, the *ENALIORNITHES* of the Cambridge Upper Greensand, and *Baptornis* of the American Chalk; the third the *ICHTHYORNITHES* of the aforesaid Kansas deposits, and all other existing Birds, with various extinct species closely allied to them.

Of the points of distinction between the Neornithes and the Archaeornithes the most important are that the metacarpals are fused together, the second digit being the longest, and the third more or less reduced; and that the number of caudal vertebrae does not, as far as is known, exceed thirteen, of which the last five or six combine together to form a pygostyle, except in the Hesperornithes, Ratitae, and Tinamidae, where such is seldom the case.[2] The *centra* of the vertebrae also are concave on one side only, except in *Ichthyornis*, and perhaps in *Enaliornis*. The possession of teeth is, of course, exceptional, as is the remarkable loss of the keel of the sternum in the Ratitae.

It is now generally, if not universally, agreed that Flightless Birds were developed from those that could fly. It does not, however, necessarily follow that the Neornithes are direct

[1] A doubtful genus, *Laopteryx*, has been described from the Jurassic by Marsh, *Ann. Nat. Hist.* (5) vii. 1881, p. 488.

[2] H. Gadow, Bronn's *Thier-Reich, Aves, Syst. Theil.* 1893, p. 90.

descendants of the Archaeornithes, as each may be a separate offshoot from the same parent stem. All we can safely assert is, that the former were in existence about the end of the Jurassic times, that teeth were still retained in some cases during the Cretaceous Epoch, and that not only normal forms, but also flightless forms without keel or pygostyle,[1] had arisen by that date.

(A) The **Ratitae** are commonly characterised as Birds with no keel to the sternum; but this will not hold as a definition, since *Hesperornis* has also that peculiarity, while such genera as *Didus*, *Stringops*, *Cnemiornis*, and *Notornis* are nearly in the same condition. It is no one point, therefore, but the sum of many, which enables us to draw so clear a line of demarcation between this primitive group and the remainder of existing forms; nevertheless it is convenient to preserve the name unaltered, as it is well understood to what members of the class it is more especially meant to apply. The rhamphotheca, or horny sheath of the bill, instead of being simple, is composed of several more or less separate pieces, as in the Procellariidae, Tinamidae, and Steganopodes; the quadrate bone, by means of which the lower jaw is articulated to the skull, in place of two proximal knobs has only one, as in *Hesperornis*, *Ichthyornis*, and the Tinamidae; the coracoid and scapula are fused together, and meet at an obtuse, as opposed to an acute or right, angle; and the last six or seven caudal vertebrae do not coalesce into a pygostyle, or upright triangular expansion to carry the rectrices, a state of things found elsewhere in *Hesperornis* and the Tinamidae.[2] The reduced wings preclude flight; the tail is functionless, as in the Podicipedidae and Tinamidae; the tongue is very small; the oil gland is absent; the penis is large and erectile, being comparable to that of the Anseriformes; while in the adult the feathers are evenly distributed over the whole surface, as in the Spheniscidae and Palamedeidae, no down being present. Claws are found on the pollex and index in *Struthio* and *Rhea*, or occasionally on the third digit; in *Casuarius*, *Dromaeus*, and *Apteryx* they occur only on the index.

Ratite Birds proper are comprised in six groups, STRUTHIONES or Ostriches, RHEAE or Nandus, MEGISTANES or Cassowaries and Emeus, APTERYGES or Kiwis, DINORNITHES or Moas, and AEPYORNITHES or Rocs.

[1] H. Gadow, Bronn's *Thier-Reich*, *Aves*, *Syst. Theil.* 1893, p. 90.

[2] A pygostyle is occasionally found in *Struthio* and *Apteryx*.

I. STRUTHIONES.

Fam. **Struthionidae**.—These birds are distinguished from all others by having only two toes—the third and fourth—the terminal phalanges of which are shortened and bear thick stunted claws, that of the outer toe being commonly absent. The whole foot, including the long scutellated metatarsus, is exceptionally stout, and the toes are padded beneath. The beak is short, broad, and depressed, with deeply split gape; the head is small, with large eyes; the neck very long; the wing- and drooping tail-feathers —the plumes of commerce—are large and soft, with broad equal vanes. The furcula and syringeal muscles are wanting, nor is there any aftershaft.

Struthio camelus, the Ostrich or "Camel-bird" of North Africa, now extends from Barbary to Arabia, and even to Mesopotamia, though no longer found, as of old, in Egypt or Central Asia, its former occurrence in Baluchistan being somewhat open to question. It is black with white wings and tail, having a flesh-coloured neck covered with brownish down, and partially bare tibiae of the same hue. The female and young male are almost entirely cinereous, while the chicks are clothed with bristly yellowish-white down with blackish stripes. The eggs of the typical northern bird have a surface like ivory, while those from Southern Africa are marked with close-set pits, whence some authorities recognise a different species (*S. australis*) in the latter region, distinguishable, moreover, by the bluish colour of the naked parts. Examples from Somaliland and the adjoining districts of East Africa to Lake Tanganyika are separated as *S. molybdophanes*, on account of the leaden colour of the unfeathered portions, coupled with a red patch on the front of the metatarsus. The eggs are smoother than in the southern species, but similarly pitted. The fossil forms *S. asiaticus* from the Pliocene of the Siwalik Hills of India, and *S. karatheodori* from the Upper Miocene of Samos complete the family, while *S.* (*Struthiolithus*) *chersonensis* has been founded on a petrified egg from the government of Cherson in South Russia.

The Ostrich stands about eight feet high, being the largest of existing birds; it frequents sandy wastes and dry arid localities, such as are found in the Sahara and the plains and valleys of Southern Africa, while districts studded with low bushes are not unfrequently tenanted. Though the fable of the head being hidden

to avoid detection is of course devoid of foundation, this species is timid and wild in its native haunts, and being keen-sighted as well as wary, gives an impression of great restlessness. From the fact that a single stride is said to cover twenty-five feet or more, it will readily be understood that the speed is very great, exceeding that of a galloping horse; but, owing to its habit of running in a curve, it is generally possible to intercept the bird's path at a distance from the point where it started. In motion the head is held forward, and the wings are outspread, while both beak and feet are used as weapons of defence when capture is imminent, the latter delivering strong sideways kicks, which make close quarters very dangerous. Forty or fifty individuals may at times be seen in company; the usual parties, however, consist of five or six at most, especially during the breeding season, when the polygamous cock escorts a flock of several hens, obtained by battle or allured by courting performances earlier in the season. A liking for the companionship of zebras, hartebeests and other antelopes, has been noticed by various observers. The cry is said to be hoarse and mournful, resembling the roar of a lion or

FIG. 8.—Ostrich. *Struthio camelus.* × $\frac{1}{19}$.

the lowing of an ox; but Ostriches are, as a rule, decidedly silent. In a state of nature the food consists chiefly of herbage, including seeds and fruits; in captivity the diet is of every description, and even in a wild condition small mammals, birds, reptiles, and insects are eaten, with a quantity of grit to aid digestion. In confinement the birds become very tame, and will then swallow bones, nails, and the like—in fact almost anything they can pick up. They can exist for a long time without water, but drink regularly when opportunity offers; they show a liking for salt, and will bathe in the sea or in rivers, immersed up to the neck. The hens belonging to one cock lay in the same nest, which is a fairly shallow excavation dug in sand or dry soil, and surrounded by the material thrown out during the process, or more rarely by an edging of grass. The spot is hard to discover in the desert, the stride being too long for tracks to be of much assistance. More than thirty yellowish-white eggs are sometimes deposited within the pit in circular arrangement, and many more are dropped around, to serve, it is asserted, for food for the newly-hatched young; in the wild state, however, the average number is probably less. The contents, equal to those of some two dozen hens' eggs, are used for food by the natives, the shells forming convenient pots for water and so forth. The cock undertakes almost the whole duty of incubation, being occasionally relieved by the hens during the daytime;[1] but when the sun is hot no brooding is necessary, though a covering of sand is superposed to guard the spot from the depredations of marauders. The chicks, which run from the shell, are hatched in six or seven weeks, and are accompanied by both parents, the male often counterfeiting wounds to draw away the intruder, circling around with drooping wings or throwing himself down as if in extremities.

Ostriches were well known to the ancients, who used the plumes for ornament, as we do; these were considered emblems of justice from the equality of the two webs, or were worn in token of victory, as is still done in some parts of Africa. The words of Aristotle—who was followed by Pliny in the statement that the Ostrich was part quadruped, part bird—combine with those of Xenophon to bear witness to this knowledge, while monuments, inscriptions, and even the Bible tell the same tale. In the Sahara and elsewhere these birds are hunted with horses and camels,

[1] P. L. Sclater, *P.Z.S.* 1895, p. 401.

being stalked or ridden down by means of fresh relays of beasts; the Namaquas draw a cordon round them; the Bushman, concealed in sand or disguised in skins, shoots them with poisoned arrows: while the lasso, pitfall, or other device are used in particular districts. Space will not permit a detailed account of the Ostrich farms of modern Africa, so well described in Messrs. de Mosenthal and Harting's *Ostriches and Ostrich-Farming*, and other books; but it may be mentioned that the tribes of the north of that continent have long been in the habit of domesticating the bird, that the value of the sales in South Africa is not far from a million pounds yearly, and that the plumes are plucked or, preferably, cut about twice a year, the adults yielding the finest feathers. The flesh is coarse, and of little use for food.

II. RHEAE.

Fam. **Rheidae**.—The Rheas, or Nandus, have the head, neck, and bill much like those of Ostriches, the maxilla being somewhat more rounded and terminating in a nail-like process; the metatarsus is also similar and equally stout in proportion, but the toes are three in number in place of two, the mid-phalanges being shortened and the terminal furnished with decided claws. In *Rhea darwini* alone the metatarsi are mainly reticulated instead of scutellated anteriorly, and have the upper portion feathered. The bones of the wing are comparatively well developed, the feathers being slender but not ornamental, while there is no apparent tail. The furcula is wanting, as is the aftershaft in adult feathers, but the syrinx is tracheo-bronchial with one pair of syringeal muscles, a condition absolutely unique among the Ratitae. The head and neck are feathered, only the lores, orbits, and ear-openings being naked, and of these the latter are surrounded by bristles.

Rhea americana, the so-called American Ostrich, the Ema of the Brazilians, the Avestruz, Nandú, or Chueké of Argentina, is found from Bolivia, Paraguay, and South Brazil to the Rio Negro, if not further; it is brownish-grey with blackish crown, nape, and breast, white thighs and abdomen, and yellowish neck. The sub-species *R. macrorhyncha* of North-East Brazil is darker, with longer bill and more slender metatarsi. *R. darwini*, which occurs south of the Rio Negro, and up the Andes to Tarapacá, is buffish-brown, with whiter under parts and white margins to the

feathers of the wings and back. Hens are not so dark, and Mr. Hudson says[1] that in *R. darwini* the young are dusky grey and are hatched with the legs feathered to the toes. Rheas are shorter than Ostriches by about a couple of feet, *R. americana* being the largest form; the feathers are much rounded, broad, and very soft. Fossil remains occur in the Upper Tertiary or quite recent deposits of South America.

Fig. 9.—Nandu. *Rhea americana*. × $\frac{1}{20}$.

The members of this family find their favourite haunts on the treeless flats of the Argentine Pampas, the scrub-covered plains of Patagonia, or the dry open Sertoẽs of Brazil, where their acute vision enables them to detect the approach of enemies from afar. Small flocks of from three to seven individuals are met with at certain seasons, and parties of twenty or thirty at other times—often with deer or guanacos—so it would appear that, as in the case of the Ostrich, larger companies are formed after the young are able to provide for themselves. The birds become exceedingly tame when not molested, but when danger threatens they run at great speed, doubling upon their pursuers constantly, or crouching down among bushes or other cover, if they think they can escape observation. In the latter case they will lie closely until almost trodden upon, and may be shot before they rise by the hunter who cautiously approaches their hiding-place, as the head is usually visible above the surrounding vegetation. When moving at full pace the wings have normally a somewhat drooping position, but they are raised alternately above the back

[1] *Argentine Ornithology*, ii. 1889, p. 220.

—apparently to aid progress—when fresh exertions are necessary. Mr. Hudson tells us [1] that Darwin's Rhea "carries its neck stretched forward, which makes it seem lower in stature than the allied species." The diet consists chiefly of grass, roots, and seeds, but berries of *Empetrum* are a favourite food, and lizards, insects, worms, and molluscs are said to be eaten, together with hard substances to promote digestion. Nandus take readily to the water, and can swim across a river several hundred yards wide, the body being hardly visible. In spring the cock utters a deep, resonant, booming noise, a loud hiss being not uncommonly heard also; while at that season the rival males attack each other viciously with their beaks, trampling down the ground in their passion, but not generally using their feet, as they do when wounded. The hens secured by each of the cocks lay together in a mere depression in the soil with very little, if any, lining; the eggs numbering from twenty to thirty, or exceptionally more, besides those scattered about outside the nest. Here again Mr. Hudson is our authority for stating [2] that the eggs of *R. americana* are golden yellow when fresh, those of *R. darwini* deep rich green; both however fade quickly to a whitish colour. The male incubates very closely for about six weeks, often taking up his position, as the Ostrich does, before the final egg is laid; he afterwards attends upon the young, and charges intruders who seem dangerous, with outstretched wings and beak. Rheas may be captured by riding after them in a semicircle, which closes upon them as they go, or by means of long-winded hounds; but the most usual method is that of hurling the "bolas" or leaden balls connected by leather thongs, which wind around the bird's neck or legs, and thereby hamper its movements or throw it down. The feathers, though inferior to Ostrich plumes, are much used for brooms and the like, and are said to be called "Vautour" in the trade. The flesh is very poor. These birds breed both on the Continent and in Britain.

III. MEGISTANES.

The MEGISTANES comprise the *Casuariidae* or Cassowaries, and the *Dromaeidae* or Emeus, the following being the chief peculiarities of the group. The wings are quite rudimentary;

[1] *Argentine Ornithology*, ii. 1889, p. 220. [2] *Op. cit.* pp. 218, 220.

the aftershaft of the contour feathers is extremely large, so that they appear to be double: three front toes are present, with shortened mid-phalanges and large claws; and the two clavicles do not meet. The lack of ornamental wing- or tail-plumes, and the hair-like nature of the coat is also characteristic, while, as opposed to *Rhea*, there is no indication of syringeal muscles. Within the group itself the Cassowaries are distinguished from the Emeus by the points next to be mentioned. The former have a compressed keeled beak and a large casque of bony tissue upon the bare head, the greater part of the neck being also naked and in most cases wattled; the remiges are reduced to thick black barbless quills from four to six in number, and the inner toe has a particularly long sharp claw. Emeus, on the contrary, have a broad depressed beak, short feathers on the head and neck, no helmet, wattles, or spines on the wing, and an ordinary claw on the inner toe. Both Families have long necks, stout metatarsi covered with coarse roundish scales, and toes padded below; the tibia being nearly, if not quite, covered by the plumage.

Fam. I. **Casuariidae.**—Following Professor Salvadori,[1] Cassowaries may be divided into two groups: the first with the helmet laterally compressed, and the second where it is triangular and pyramidal, or even depressed. They are all large birds, though smaller than Emeus, which are only surpassed in size among existing forms by the Ostrich; the colour of the coarse but glossy hair-like plumage is black, and similar in both sexes; the hen is bigger than the cock, as is also the case in the Dromaeidae and Apterygidae.

Of the first of the above groups, *Casuarius tricarunculatus*, from Warbusi in New Guinea, which is possibly a "sport," has two lateral wattles on the fore-neck and a third small median caruncle at a lower level. *C. bicarunculatus*, of the Aru Islands, has two long distant reddish-violet wattles, a black casque, bluish-green head, and blue neck with some red behind. *C. galeatus* of Ceram, the species first known to ornithologists, is similarly coloured, though less brightly, and has the flesh-coloured throat-wattles close together, and a naked reddish-purple space on each side of the neck. The larger *C. australis* of North-East Australia has a higher helmet, a brighter blue throat, and a few scattered hairs on the wattles, which Wall, who discovered the species, said were coloured with blue and scarlet. *C. beccarii* of the Aru Islands,

[1] *Ornitologia Papuasia e Molucche*, iii. Torino, 1882, p. 473.

Middle and South New Guinea, has the front and top of the casque black, its sides greenish, and its back yellowish; the head is grey-blue, the throat and sides of the neck are blue, the hind-neck is red and orange, a yellow streak running across to the mandible; a bare space on each side of the base of the neck is flesh-coloured, and the long single neck-wattle of the same colour is somewhat deeply divided at the tip.

Of the second group, *C. uniappendiculatus* (Fig. 10), of Salawatti and the adjoining parts of New Guinea, has the head, throat, and nape blue, the lower portion of the neck and the median pear-shaped caruncle yellow, the casque dusky olive, and a longitudinal naked space towards the sides of the neck flesh-coloured with a yellow margin. *C. occipitalis* of Jobi Island is distinguished from the last-named by a large occipital spot of yellow and a paler helmet; while the remaining three forms have no wattle at all. Of these, *C. papuanus*, of North-East New Guinea, has a dusky black casque, blue head, throat, and fore-neck, grey-green occiput and auricular region, and orange hind-neck changing into rosy flesh-colour towards the sides. *C. picticollis* of South-East New Guinea has a black helmet, grey-blue occiput, violet-blue nape, pale blue hind-neck, red throat and longitudinal space on the sides of the lower neck; *C. bennetti* of New Britain differing in having the head and neck of an almost uniform blue. Nestling Cassowaries are clothed in rusty brown, relieved by darker stripes; at a later period they become more tawny, and the black plumage begins to appear; but a few hair-like feathers remain on the head for some time, while the helmet is very gradually developed from a flat Coot-like shield, though the gaudy colours of the neck and wattles are assumed much earlier.[1]

All the species of this family inhabit wooded country, commonly of the densest description, though often found in more open scrub and in the neighbourhood of creeks and watercourses. Naturally shy but inquisitive, they have been rendered doubly wary by man's persecution since their haunts have been invaded by colonists. They dislike the sun, and emerge from cover only in the morning and evening, to seek their favourite spots, where they feed chiefly on fallen fruit, varying this diet with insects and crustaceans. Berries, leaf-buds, and bulbs are, however, also eaten, with grit and pebbles for digestive purposes, and in

[1] Cf. E. P. Ramsay, *P.Z.S.* 1876, p. 122.

captivity they are almost omnivorous. In this state they become extremely tame, and are kept like fowls by the natives of some districts, who consider the flesh very palatable; while in Queensland the adults are said to be hunted with dogs. The plumage is used for the manufacture of mats, rugs, head-ornaments, and the like. Cassowaries run with wonderful swiftness, though rather heavily, diving into the bushes at a moment's notice, or

Fig. 10.—One-wattled Cassowary. *Casuarius uniappendiculatus.* $\times \frac{1}{14}$. (From *Nature.*)

aiding themselves by their wings, and leaping over obstacles as much as six feet high, if shelter is not readily available. They usually rest on the whole of the metatarsus, but sleep on the breast, or perhaps occasionally on the side; at other times they will dance about with contortions of the neck, or roll on the ground like playful monkeys. Old males become very fierce when driven to bay, kicking out in front or sideways, ruffling up their feathers and using their beaks at the same time. In the wet season swimming is a common practice, wide rivers being

crossed with ease, and in the absence of other bathing-places the sea is often utilised. The note in a state of excitement is a sort of grunt or snort, the call to the young being of a lowing nature; but the ordinary voice is loud, guttural, and unearthly, consisting of quickly-repeated croaking sounds, lasting for as long as three minutes, and audible at a distance of a mile, or considerably more. The female is much quieter, while the "Mooruk" (*C. bennetti*) is stated to utter a low scolding or plaintive whistle. A rough nest of leaves and grass is formed in a depression of the soil, generally below bushes or tangled undergrowth, in which from three to six very large eggs are deposited, often placed in the shape of the letter V. These are normally light green in ground colour, with close-set granulations of dark bright green; but one, if not more, is ordinarily of a perfectly smooth texture, and is therefore entirely light green. The cock incubates, it appears, solely, though some say that the hen takes her turn; and the former tends the young when hatched, the period of sitting being about seven weeks. The nest is said to be covered by the parent if left for a time, but this is uncertain, as is the use of the two or three eggs scattered round the nest, which are asserted by natives of widely-distant districts to furnish food for the chicks. After breeding, small flocks are formed in some cases, possibly by the combination of two families. The Ceram species, which seems to have been called "Emeu" or "Ema" by the early Portuguese navigators, often lays eggs in captivity, while *C. bennetti* has bred in the gardens of the Zoological Society of London.

Fossil remains occur in Australia. *Hypselornis sivalensis* is an allied form from the Pliocene of the Siwalik Hills in India.

Fam. II. **Dromaeidae**.—From about the beginning of this century the name "Emeu," used, as mentioned above, in varying form for both the Rhea and the Cassowary, has been restricted to the genus *Dromaeus*, the members of which stand more than five feet high, though lower on their legs than an Ostrich. *D. novae-hollandiae* of the interior of Eastern Australia, which extended in times past to Tasmania and the islands in Bass's Straits, is blackish grey, with black tips to the plumage. *D. irroratus*, a more slender species from West, and probably the adjoining parts of South, Australia, has each feather transversely barred with dark grey and white, and a rufous margin to the black patch at the end. Young birds in down are greyish-white, with longitudinal blackish streaks above,

and spots on the head and lower parts. The sexes are similarly coloured, both possessing a remarkable tracheal pouch, connected by a slit with the windpipe, and only fully developed in adults.[1]

In their general habits Emeus are not unlike Cassowaries, but they inhabit sandy plains or open forest districts, being invariably monogamous, though seen in small parties after breeding. Their sight is keen, they run strongly and rapidly, rest on the whole metatarsus, and kick out backwards towards the side.

FIG. 11.—Emeu. *Dromaeus novae-hollandiae*. × $\frac{1}{20}$.

The food is of fruit, roots, and herbage, generally obtained in the morning or evening; water is freely drunk, and the birds love bathing, being capable of crossing even a broad river. They utter at times a hissing or grunting sound, but in the nesting season a peculiar loud booming or drumming note is produced, probably in connexion with the tracheal pouch. The nest may be a mere hollow scraped in the ground, with or without a surrounding ring of grass or plant-stems, or a mound of bark-scales some three inches high[2]; the eggs are from seven to thirteen in number, or even more, and are of a dark, or occasionally light,

[1] Cf. Murie, *P.Z.S.* 1867, p. 405.

[2] North, *Nests and Eggs of Australian Birds*, Sydney, 1889, p. 293.

green colour, while the surface is covered with granulations which give it the appearance of shagreen. They are small for the size of the bird, being less than those of the Cassowary. The cock performs the duties of incubation, and it is very doubtful whether the hen ever assists him; the chicks break the shell in about eight weeks. The flesh is moderately good for eating, and the fat below the skin yields a large quantity of oil. The birds are constantly hunted with dogs or shot on account of the damage they do to wire fencing and the grass they devour. Emeus are easily domesticated, and propagate readily in semi-confinement, being perfectly hardy in Britain and elsewhere.

D. patricius is a fossil species from the Plistocene of Queensland and New South Wales. *D. gracilipes* is another extinct Australian form, but *Dromornis australis* of Queensland may indicate a distinct group of Ratitae.[1] *Dromaeus ater*, of Kangaroo Island, off the south coast of Australia, is now extinct, though a stuffed skin and a skeleton are in the Paris Museum.[2]

IV. APTERYGES.

The APTERYGES, or Kiwis, have been recently shown to be much more nearly related to the Dinornithes than to the remaining Ratite forms, and are accordingly placed in close proximity to them in the classification here adopted. Professor T. J. Parker has, moreover, lately formulated a new system—excluding the *Aepyornithes*, which may commend itself to many persons as a further improvement.[3] In this, the Order *Struthiones* contains the family Struthionidae, and the *Rheae* the Rheidae; but the third Order, upon which the name *Megistanes*, Vieillot, is bestowed, includes two Sub-Orders—*Casuariformes*, comprising the Casuariidae and Dromaeidae, and *Apterygiformes*, with the Dinornithidae and Apterygidae. In other words, the original stock is considered to have produced three Ratite branches only, the third of which gives rise to two twigs, each of these separating again into two smaller twigs representing the Families.

Fam. **Apterygidae.**—These birds are at once distinguished

[1] For an extinct gigantic bird from Callabonna, South Australia, with enormous skull (*Genyornis newtoni*), see Stirling, *Nature*, l. 1894, p. 206; Stirling and Zietz, *Tr. R. Soc. S. Austr.*, xx. 1896, pp. 171-211.

[2] Cf. Milne-Edwards and Oustalet, *Vol. Centenaire Mus. N. H. Paris*, 1893, pp. 62-67.

[3] *Tr. Zool. Soc. London*, xiii. 1895, pp. 425-427.

from all their allies by their small size, and by the long, weak, decurved bill, which tapers regularly and has the nostrils placed almost at the extremity. The head and eyes are comparatively small, as will be seen to be the case in the Dinornithidae. The legs are very stout and situated backwardly, a small elevated hallux is present, and the toes are provided with long, sharp claws. The moderate metatarsus is reticulated in the young, but is clothed with fairly large scutes in the adult, when it becomes much smoother. The wings are small-boned and invisible, with functionless quills, the tail is rudimentary, the aftershaft and furcula are absent, while many elongated hairs occur on the front of the head.

FIG. 12.—Kiwi. *Apteryx australis.* × $\frac{1}{7}$.

These curious flightless birds are confined to New Zealand, whence a specimen was brought to England as early as 1813. *Apteryx mantelli,* of the North Island, is deep red-brown with longitudinal streaks of yellowish-brown, the head being darker and the lower parts greyer; *A. australis,* of the South Island, is lighter, and feels soft instead of harsh when grasped. *A. oweni,* of both islands, is much smaller, and is light grey-brown, transversely marked with blackish bars. *A. haasti,* also said to occur in both islands,[1] is a larger and darker form of the last named; *A. lawryi,* of Stewart Island, hardly differs from *A. australis*; while *A. maximus,* of Verreaux, is a very doubtful species. Mr. Rothschild [2] has founded a sub-species (*occidentalis*)

[1] Rothschild. *Bull. Ornith. Club,* I. 1893, pp. lx. lxi. [2] *Loc. cit.*

on examples of *A. owenii* from the North Island and the west of the South Island. In all these birds the lanceolate feathers have a hair-like texture, due to the disunited filaments of the upper portion, the lower part being covered with grey down, and the rhachis more or less exserted. The tibia is feathered, the bill being yellowish, and the feet brown or black. The female is similar, but larger, the young blacker. Mr. Lydekker has described a fossil species, *Pseudapteryx gracilis*, from New Zealand,[1] and Mr. De Vis *Metapteryx bifrons* from Queensland.[2]

Kiwis inhabit wooded country and hills up to the snow line; they are still met with at low elevations on a few islands, but their retreats are now chiefly on the slopes and in the gullies of the mountains, where a dense undergrowth of shrubs and tree-ferns shades a carpet of creeping vegetation and moss. Here parties of from six to twelve used to be seen, though in the breeding season they separated into pairs, but at the present day flocks can hardly be hoped for. In the daytime these shy birds hide in burrows in the ground, or natural cavities under tree-roots or rocks, while towards dusk they emerge in an animated condition. The direct rays of the sun seem to dazzle them, and they roll themselves up into balls, if not disturbed; when stirred up they are somewhat sleepy and quickly retreat to cover. Lengthy strides carry them along at a great pace, the body being held obliquely with outstretched neck; and, if molested, they ruffle up the plumage and snap the bill, while striking viciously with their feet at the intruder, the leg being drawn up to the breast and the blow delivered downwards. Sometimes they rest upright with the point of the bill touching the ground, sometimes upon the whole metatarsus, but usually they are seen at feeding time cautiously moving from spot to spot, and tapping the soil or the walls of their cage with their long sensitive beaks. A sniffing sound accompanies this operation, and probably the smell of food assists in its discovery, yet the sense of touch is no doubt the primary agent. The diet consists chiefly of worms, in search of which the ground is deeply probed, and shows funnel-like holes scattered over its surface; when a capture is made the worm is extricated with a gentle wriggling motion, and is either beaten upon the ground to kill it, or swallowed at once with a jerk of

[1] *Cat. Fossil Birds Brit. Mus.* 1891, p. 218.
[2] *P. Linn. Soc. N. S. Wales* (2), vi. 1891, p. 448.

the head. Grubs, beetles, molluscs, and berries are also eaten, with grit or pebbles as digestives. The loud whistling note, which gives the name to the Kiwi, is chiefly heard on light nights, that of the female being shorter, and the young uttering a chuckling or kitten-like cry. Growls are emitted by the birds when disturbed, and they have a curious way of yawning in the daytime. The nest is usually in an enlarged space at the end of a round tunnel in the soft earth, said to be made by the female alone, the opening being under a tree-root, a stone, or a tussock of grass; it consists merely of a little dry fern, herbage, or a few leaves. The eggs—generally two in number, though one is often found, and three are recorded—are enormous for the size of the bird, and are equal to a quarter of its weight; they are pure white, or slightly green in hue, with a smooth surface, recalling by their appearance those of the Whooper. The Maories are very fond of the flesh, either roasted or boiled, and hunt Kiwis systematically with muzzled dogs, while of old the chiefs utilised the plumage for ornamentation. The cock performs most, if not all, of the duties of incubation, and attends upon the young. Females lay in captivity, but no chicks appear to have been hatched as yet under these conditions.

V. DINORNITHES.

The Family **Dinornithidae** contains those well-known extinct New Zealand forms the Moas, as they are supposed to have been denominated by the Maories, some of which were of gigantic size. The larger species must have been comparatively rare, judging by the fossils obtained, while some seem to have survived until about four or five hundred years ago, or even a century later in the South Island. Being flightless, these birds were easily slaughtered by the natives, who were very fond of the flesh, and were captured when exhausted by repeated spear-wounds, after they had been driven from their retreats by burning the grass and vegetation. It was not until the year 1839 that a femur-shaft was exhibited by Owen to the Zoological Society of London, that being the first portion of a Moa known to have reached this country; but since the above date an immense quantity of bones of all descriptions have been procured in many parts of both the North and the South Islands, some hidden under the sand or exposed upon

its surface, some in marshes and superficial deposits generally, and others in caves, hollows of rocks, or cooking places of the former inhabitants. Footprints have been observed in the sandstone; portions of muscles, ligaments, and even of skin have been discovered; and, most remarkable of all, feathers have been met with of fresh appearance and unfaded colours. Pebbles used to aid digestion, and eggs, both whole and fragmentary, complete the list.

Moas had comparatively small heads, and also small orbits and eyes; the bill varied, as will be seen below; the legs were stout, though not always equally so, a hallux being usually present; the wings were extremely reduced, or even wanting; the furcula was absent, and the aftershaft of the larger feathers was of great size. The neck is supposed to have been partially bare, while the webs of the rounded feathers were disunited and more or less downy below. Some of the latter were black, with red-brown bases and white tips, others were blackish-brown or yellowish.

Professor Parker, in his recent memoir,[1] proposes three Sub-families, *Dinornithinae*, *Anomalopteryginae*, and *Emeinae*; *Megalapteryx*, which he omits, possibly representing a fourth. The first of these contains only one genus, *Dinornis*, with wide convex sternum, comparatively slender limbs, broad skull, and long, wide, deflected beak; the height of *D. maximus*, the largest of the whole group, being estimated at about twelve feet. The second Sub-family comprises three genera, *Pachyornis*, *Mesopteryx*, and *Anomalopteryx*, forms of small or moderate height and varying bulk, with less broad skulls and pointed beaks, the sternum ranging from long and narrow to wide and flat. The third possesses a single genus, *Emeus*, in which the limbs are heavy, the strongly-built skull is narrow, and the beak short and broad. *Pachyornis elephantopus* has extraordinarily stout, short legs, while *Anomalopteryx parva*, perhaps the smallest Moa known, is said to have been about the size of a turkey. The validity of some genera and species is, however, questionable. Most writers think that the female was larger than the male. Mr. De Vis has described a fossil femur from Queensland as *D. queenslandiae*,[2] but it may belong to the Dromaeidae. According to native testimony the habits were sluggish, but the birds were dangerous to approach; they lived in pairs and fed upon green shoots and roots of ferns, making a nest of a pile

[1] *Tr. Zool. Soc. London*, xiii. 1895, pp. 373-431.

[2] *P. Soc. Queensland*, i. 1885, pp. 23-28.

of grass and leaves. We are told that the eggs found with the remains were dark green, light green, or yellowish, but the last colour at least probably refers to faded specimens.

VI. AEPYORNITHES.

Quite as remarkable as the Moas are the immense, massive-limbed forms of the Family **Aepyornithidae,** supposed by many to be identical with the "Ruc" or "Roc" of the Venetian traveller Marco Polo, and of the *Arabian Nights*. If this is the case, the size of the birds and their eggs must have been absurdly exaggerated, since the largest species known probably stood about seven feet high, and the egg is certainly not as big as a butt; nevertheless, the fact of the Roc being accredited to Madagascar makes it probable enough that the fables were engrafted upon *Aepyornis*, which was an inhabitant of that island. The eggs were first brought to the notice of ornithologists by Strickland in 1849, while soon afterwards Isidore Geoffroy St.-Hilaire obtained two of them, with some fragments of bones.[1] These eggs, which exceed all others in magnitude, measuring some thirteen inches by nine and a half, have now been obtained in considerable numbers, with a large quantity of fossil remains of the birds themselves; and in consequence about twelve species have been indicated, and a second genus, *Mullerornis*.[2] It is supposed that some of them were in existence not more than two hundred years ago. The most salient points of their structure are the long, stout legs, with four toes and broad flat metatarsi, the apparently rudimentary humeri, the absurdly short keel-less sternum, and the frontal pits, indicating a large crest, comparable to that supposed to have existed in certain of the Dinornithidae.[3] The shell of the eggs, some of which contain two gallons, is used by the natives to hold liquor, and is slightly pitted.

It will be remembered that, in the arrangement here followed, Dr. Gadow placed the *STEREORNITHES* under the head of Neornithes Ratitae, though not under that of Ratitae in the restricted

[1] *Ann. Sci. Nat.* (3) xiv. 1850, pp. 205-216.

[2] Milne-Edwards and Grandidier, *C. R. Ac. Sci.* cxviii. 1894, pp. 122-127; Andrews, *Geol. Mag.* 1894, p. 18; *id. Ibis*, 1896, pp. 376-389.

[3] Parker, *Tr. N. Z. Inst.* xxv. 1892, p. 3.

sense; but it should be noted that their systematic position was not by any means assured, though justified by what was then known of these extraordinary fossils, of which the sternum has not even yet been brought to light. Remains of various forms, chiefly of gigantic size, have been disinterred from the Miocene strata of Santa Cruz in Patagonia, one of which (*Phororhachos*) was described in 1887, by Dr. Ameghino,[1] from its mandible as an Edentate Mammal, though four years later [2] he arrived at the more correct conclusion that the jaw was to be referred to a bird. In 1891, moreover, Señores Moreno and Mercerat [3] proposed a new Order with the name of *Stereornithes*, when publishing a series of fine plates; while Dr. Ameghino, who criticised their work, reduced the nine genera created therein to the smaller number of three.[4] Another paper by the author last named,[5] and two by Mr. Lydekker [6] should be consulted by those interested in the details of the subject, while an admirable summary will be found in Professor Newton's *Dictionary of Birds*. In a review of Dr. Ameghino's paper on these birds,[7] Mr. C. W. Andrews stated that *Phororhachos* and others of the "Stereornithes" were not truly Ratite, but were Carinate forms in which the wings had undergone reduction, and suggested that possibly they were related to the parent stock of the Gruiformes, approximating particularly to *Cariama* (*Dicholophus*). Shortly afterwards Dr. Ameghino's collection was acquired by the British Museum, and a study of the specimens themselves has not caused the reviewer to change his opinion.[8] Some members of the group (e.g. *Mesembriornis*) are perhaps truly Ratite, and one at least (*Dryornis*) belongs to the *Cathartidae*. *Phororhachos* is remarkable for the immense size and heavy build of the skull, to which the legs, huge though they sometimes are, bear no proportion; the maxilla is exceedingly compressed, yet very deep, and ends in a strong hook, while the long massive mandible curves upwards to meet it. There is a quite or nearly complete interorbital septum in this case, as opposed to *Apteryx*, and, to a considerable extent, to the Dinorni-

[1] *Bol. Mus. La Plata*, i. 1887, p. 24. [2] *Revist. Argent.* i. 1891, p. 255.
[3] *An. Mus. La Plata, Pal. Argent.* i. 1891, pp. 20, 37.
[4] *Revist. Argent.* i. 1891, pp. 441-453.
[5] *Bol. Inst. Geogr. Argent.* xv. 1895, pp. 11, 12.
[6] *Ibis*, 1893, pp. 40-47; and *Nat. Sci.* 1894, p. 125.
[7] *Ibis*, 1896, pp. 1-12; see also Gadow, *op. cit.* pp. 586, 587.
[8] *Science Progress*, v. 1896, pp. 398-416.

thidae; while the nostrils are pervious, and the quadrate articulates with the skull by two heads, contrary to what occurs in the Ratitae proper. The furcula is existent, but extremely slender: the metatarsus is more or less elongated, the hallux is present, the wings are small but well developed, and the tail is said to be long, with a considerable number of separate vertebrae.

This genus includes the species *P. longissimus, P. inflatus; P. platygnathus, P. modicus, P. gracilis,* and *P. schuensis; Brontornis,* which has a shorter and wider mandible and smaller but stouter metatarsi, possesses in *B. burmeisteri* a form as large as *Aepyornis maximus*, while *Opisthodactylus* and other proposed genera are too imperfectly known to deserve consideration in our limited space.

Besides the above, Dr. Gadow classed with the Stereornithes, *Diatryma* of New Mexico, known from a metatarsus; *Dasornis* of the London Clay, described from fragments of a skull; *Remiornis* from the neighbourhood of Rheims, of which several imperfect bones have been found; and *Gastornis* of both England and France, of which a fair number of parts have been unearthed. All occur in the Eocene, but the question of their relationship is by no means settled, and some writers consider *Gastornis* to be nearly allied to the Anseres. This form appears to have been of the size of an Ostrich, with long leg-bones and short weak wings, and was probably flightless. Three species have been propounded, *G. parisiensis, G. klaasseni,* and *G. edwardsi.*

(B) With regard to the difficult question of the position in the system of the **Neornithes Odontolcae**, a few introductory words of explanation are necessary. In 1872 Professor Marsh bestowed upon two fossils from the Cretaceous deposits of Kansas the names of *Hesperornis* and *Ichthyornis*, which he proposed in the following year[1] to comprise in a Sub-Class *Odontornithes*, so called from the presence of teeth in the jaws. Subsequently[2] he divided this Sub-Class into two Orders, *Odontolcae* and *Odontotormae*, the former containing *Hesperornis*, with the teeth arranged in grooves, and the latter *Ichthyornis*, where they were placed in distinct sockets. His views have been controverted by many writers, but Mr. Lydekker—an authority of great weight in this connexion—while fully admitting the affinity of the first form to

[1] *Amer. J. Sci.* (3) v. 1873, pp. 161, 162. [2] *Op. cit.* x. 1875, pp. 403-408.

the Divers, and the resemblance of the second to the Gull-tribe, proposed in 1891 [1] to retain the term Odontornithes for a series of birds ancestral to the modern series of toothless Carinatae, for which he adopted the title *Euornithes*, used in a narrower sense by Dr. Stejneger. It has, however, been decided to follow Dr. Gadow on this point; while the marks of distinction given below make it seem at least probable that, whereas *Ichthyornis* may be

FIG. 13.—Restoration of *Hesperornis*. (From Huxley, after Marsh.) × $\frac{1}{13}$.

referred to the Carinate division, *Hesperornis* should be placed in closer proximity to the Ratite forms. Our Neornithes Odontolcae consequently contain the HESPERORNITHES, the ENALIORNITHES, and *Baptornis*, all of which appear to be nearly related.

Hesperornis regalis, which stood about three feet high, and *H. crassipes*, of even larger dimensions, had blunt teeth in the

[1] *Cat. Fossil Birds Brit. Mus.* 1891, p. 200; *id.* A. Newton, *Dict. Birds*, 1894. p. 651.

grooves of both maxilla and mandible, the number being thirty or more below, but considerably less above, where they did not reach to the anterior extremity. The bill was long and pointed, the rami of the lower jaw being entirely separate; the head was rather small, the neck was long, and the quadrate bone articulated with the skull by one knob only. The sternum was long, broad, and flat, without keel; the furcula was decidedly reduced, the metatarsus was moderate and laterally compressed; there were four toes, all directed forwards and probably webbed; the wing was rudimentary, being little more than a humerus; the tail was fairly long and broad, but had no pygostyle. *Enaliornis barretti* and *E. sedgwicki* of the Cambridge Greensand had leg-bones very similar to the above, but being only known from fragmentary remains, their position is uncertain; while the same may be said of *Baptornis* of the North American Cretaceous strata, which, like the two last-named, is much smaller than *Hesperornis*.

CHAPTER III

NEORNITHES CARINATAE

BRIGADE I—LEGION I (COLYMBOMORPHÆ). ORDERS: ICHTHYORNITHES —COLYMBIFORMES—SPHENISCIFORMES—PROCELLARIIFORMES

(C) The **Neornithes Carinatae**, or birds which, with few exceptions, have a keel to the sternum, include all the remaining members of the Class. It is unnecessary to recapitulate the distinctions between these forms and the Ratitae, to be found on p. 26, but it may be well to reiterate that it is the sum of all the characters that constitutes the difference, and to point out that in one or more of the items several of the Carinatae agree with the members of the aforesaid group, though totally at variance with them in the aggregate. Claws on the manus are found on the pollex and index in certain of the Anseres, Cathartae, and Accipitres, and on the pollex alone in some Anseres, Accipitres, and Galli, with individual instances in other birds.

Order I. ICHTHYORNITHES.

Enough has already been said with regard to the position of the Order Ichthyornithes, with its sole Family **Ichthyornithidae**; but it remains to discuss the several members. *Ichthyornis victor*, *I. dispar*, and the other species were small forms of about the size of a Partridge, with the habits and appearance, it is presumed, of Terns or Gulls.[1] The head was extremely large

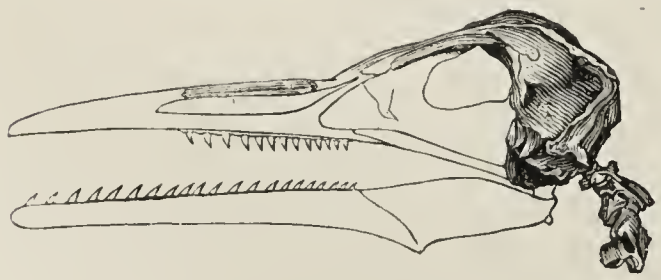

Fig. 14.—Head of *Ichthyornis*. (From Geikie, after Marsh.) × ½.

[1] This is very doubtful, as they show quite as many points of resemblance to other very different forms.

in proportion to the remainder of the skeleton; the beak was long and pointed, with entirely separate rami to the mandible: the sharp teeth, fixed regularly in distinct sockets, were inclined backwards, and occupied the whole of the lower and at least the posterior half of the upper jaw; the keel of the sternum was large and broad; the dorsal and cervico-dorsal vertebrae were biconcave, as in *Archaeopteryx*, and perhaps to some extent in *Enaliornis*; the quadrate articulated to the skull by one knob, as in the Neornithes Ratitae and Neornithes Odontolcae: the metatarsus was short and the whole foot small; a furcula was probably present; the wings were well developed, indicating great powers of flight; while the tail was comparatively short, and ended in a pygostyle. It will be observed that of these characters the formation of the jaw and its teeth, the biconcave vertebrae, and the articulation of the quadrate, are those that chiefly distinguish the Order from the rest of the Carinatae. *Apatornis celer*, also from the Cretaceous deposits of Kansas, is probably to be placed here, but other genera described from the same strata cannot yet be certainly classified.[1]

Order II. COLYMBIFORMES.

The Colymbiformes constitute a very archaic Order of Birds, and hold a somewhat isolated position. Older writers combined them with the Alcidae as a group Pygopodes, but recent anatomical investigations make it clear that Auks have more affinity to Gulls, which again trend to the Limicoline alliance. As regards structure, the two Sub-Orders COLYMBI and PODICIPEDES, with their Families *Colymbidae*, or Divers, and *Podicipedidae*, or Grebes, may be here treated together. They are all water-birds with webbed or lobed toes and extraordinarily flattened metatarsi. The sternum in the Colymbidae is much longer than broad, in the Podicipedidae short and wide, while the furcula is Y-shaped; the neck is more or less elongated; the bill in the former Family is strong, straight, acute, and compressed, in the latter moderate and sometimes recurved, being either slender, as in *Aechmophorus*, or very stout, as in *Podilymbus*. The scutellated metatarsi are set very far back, and are fairly long, the procnemial process of the tibia being remarkably elongated, though Grebes alone have a distinct patella; the hallux is very small and has a small mem-

[1] For these refer to Prof. Marsh's *Odontornithes*, New Haven, Conn. 1880.

brane, but whereas Divers have the anterior toes fully webbed, their allies have them surrounded by large lobes of skin, connected only at the base. The claws are abnormally broad and flat in Grebes, the outer margin of the third being serrated. In the Colymbidae the wing is short, narrow, and pointed, with eleven primaries and about twenty secondaries; in the Podicipedidae it is still shorter and concave in form, with twelve primaries but rarely twenty secondaries; in the latter no true rectrices can be distinguished, though a tuft of downy feathers exists, while in the former they are normal though much reduced, and number from eighteen to twenty. Grebes have bare lores, and are frequently adorned in the breeding season with crests or tippets of a golden or brownish colour; the dense glossy plumage being more commonly used for decorative purposes than the duller coats of Divers. The tongue is always long and pointed, the syrinx is tracheo-bronchial, the nostrils are pervious, an aftershaft is present, and both adults and young are uniformly downy. Fossil remains from the Oligocene of France and southern England, indicating a genus intermediate between the two Families, have been named *Colymboïdes*.[1]

Fam. I. **Colymbidae.**—*Colymbus septentrionalis*, the Red-throated Diver of the Arctic and sub-Arctic parts of both worlds, is brownish black in summer, with white under parts and white specks above; the head and neck are lead-coloured, except the nape, which is black with white streaks, and the mid-throat, which is reddish-chestnut. *C. arcticus*, the Black-throated Diver, found in the same regions though with a different distribution, as for instance in Scotland, is blacker, with white bars as well as spots; the crown and hind neck being ashy grey, the sides of the latter striped with black and white, and the throat purplish-black, interrupted by a semi-collar of white with vertical black lines. *C. pacificus* of western North America is barely separable. *C. glacialis*, the Great Northern Diver, has a much more restricted range, breeding in Iceland, Greenland, and the Fur Countries as far west as the Great Slave Lake, where it meets *C. adamsi* (hardly differing except in the yellowish-white bill), which extends thence to Northern Asia, and possibly to Spitsbergen and Jan Mayen. The former is black above, with belts of white spots making a "chess-board" pattern; the lower surface is

[1] Lydekker, *Cat. Fossil Birds Brit. Mus.* 1891, p. 192.

white, and the throat is crossed by two bands of white with longitudinal black bars, while the head and neck are black with a purplish gloss, changing to green below. In winter most Divers are found down to the northern tropic, at which season the throat becomes white, as it is in the young, in which the feathers of the upper parts are duller with whitish edges. The sexes are similar; the bill is normally black, and the feet are bluish or greenish grey. The downy chicks are sooty above.

Divers are not usually gregarious, and unless driven by stormy weather to inland waters, are essentially marine, except during

FIG. 15.—Great Northern Diver. *Colymbus glacialis.* × $\frac{1}{8}$.

the breeding season, when they ascend the rivers and seek their customary nesting-sites on the moors, the Black-throated species showing a somewhat greater preference than the rest for islands in the lakes they frequent, but the Red-throated often selecting small pools, or even "flows," among the heather. The two eggs, greenish- or reddish-brown in hue, with blackish and grey blotches and spots, are laid on a mere depression in the grass or sand close to the water's edge, or upon a mass of green vegetation which is occasionally semi-natant. Incubation is said to last four weeks. As a rule the female performs this duty, lying flat upon her eggs, and gliding or scrambling off when disturbed, whence a distinct track is often visible upon the turf. On leaving the land a dive is taken

to a considerable distance, then both parents swim towards the intruder with the body partly submerged, and finally, if thoroughly scared, they rise heavily on the wing to circle round with outstretched neck before betaking themselves with rapid but laboured flight to some neighbouring lake, from which they return at intervals until the coast is clear. They descend from aloft noisily and with great impetus, the splashing plunge being followed by a gliding movement, leaving a broad furrow behind, while on land they move with difficulty, and often rest on the metatarsus. Their croak, or loud, clear, melancholy cry is heard before storms, whence the Red-throated Diver is called "Rain-goose" in Scotland; the food consists chiefly of fish, brought to the surface and swallowed with a jerk, but crustaceans, molluscs, and perhaps aquatic insects vary the diet. The young take to the water readily, but the female occasionally carries them on her back.

Both Divers and Grebes swim strongly, the flat of the metatarsus meeting the water during the back stroke, and the thin edge on the return. When submerged they do not use the pinions.

Fam. II. In the **Podicipedidae** both sexes are mainly dusky brown or blackish grey above, and silvery white below, often with some white on the wing; so it will only be necessary to note hereafter the distinctive ornaments or bright colours which

FIG. 16.—Little Grebe. *Podicipes fluviatilis.* $\times \frac{1}{4}$.

are invariably lost in winter. *Podicipes fluviatilis,* the Little Grebe or Dabchick, ranging over Europe, Africa, and Asia to the Malay Countries and North Australia, has rich chestnut cheeks, throat, and sides of the neck, horn-coloured bill, and greenish feet. In winter the chestnut fades to buff with a white chin. Count Salvadori [1] considers *P. gularis* of Australia and Papuasia and

[1] *Ornitologia Papuasia e Molucche*, iii. Torino, 1882, pp. 469-471; cf. also Sharpe, *Bull. Ornith. Club*, iv. 1894, p. iv.

P. tricolor of the Moluccas separable, *P. pelzelni* of Madagascar being hardly so. *P. dominicus*, extending from the southern United States to Patagonia, differs in its black throat. The Little Grebe breeds commonly in Britain, while *P. cristatus*, the Great Crested Grebe or Loon, only nests on our largest waters, covering, however, a wide range in Europe, Africa, Asia, Australia, and New Zealand. It has a bifurcate crest of brown, a chestnut ruff tipped with black round the cheeks and throat, a red base to the bill and greenish feet. *P. griseigena*, the Red-necked Grebe, which wanders to our shores, but breeds in the north of the Palaearctic and Nearctic Regions, and perhaps occasionally in Morocco, has the foreneck chestnut, a line above the cheeks white, and the base of the bill yellow. Some writers denominate the North American and East Asiatic form, *P. holboelli*. *P. auritus*, the Slavonian Grebe of the sub-Arctic portions of both worlds, has a tuft of golden chestnut feathers on each side of the head, an ample black ruff, rufous chest and flanks, black bill and greenish feet: *P. nigricollis*, the Eared Grebe, of Central and Southern Europe, Africa, temperate Asia, and western North America, has merely golden ear-tufts, with a black chest. Both visit us at certain seasons. Finally, *P. nestor* inhabits South Australia; *P. rufipectus* New Zealand: *P. caliparaeus*, *P. rollandi*, and *Aechmophorus major* America south of Peru and Brazil; *Ae. occidentalis* western North America: *Podilymbus podiceps* nearly all the New World; and *Centropelma micropterum* Lake Titicaca only. The first two have white hair-like filaments on the head, the third and fourth elongated ear-coverts of golden brown or black and white; while *Podilymbus* is remarkable for its stout whitish bill with median black band and its black throat, *Centropelma* for its aborted wings and flightless condition. *Podicipes taczanowskii*, of Lake Junin in Peru, differs from *P. caliparaeus* in its longer and lighter bill and feet, and grey-brown ear-coverts. Grebes in the down are streaked with white or buff on a dusky ground, while some have a naked red space on the crown.

These migratory birds frequent reedy streams and stagnant waters in summer, being companionable, though not gregarious: hard weather, however, drives them to the sea. They walk fairly well, though awkwardly, and sit upon the whole metatarsus; but the chicks progress on "all fours," using the wings almost

as forefeet.[1] They fly straight and rapidly, with head and feet extended, but have difficulty in leaving the water; they dive at the slightest alarm, their quick sight enabling them to vanish below the surface at the flash of a gun, to reappear, with hardly a ripple, at a distance. Frequently it requires much patience to obtain a second view, as their bodies can be submerged to any extent, and at times the bill alone is exposed. In swimming they jerk the head and often rise vertically to shake their wings. They descend from the air with a splash and a glide, while in diving the feet alone act as oars, the young soon equalling their parents in this respect. The note is a harsh croak in the larger forms, a softer sound or "whit-whit" in the smaller; the food consists of fish when procurable, but small reptiles, amphibians, molluscs, crustaceans, insects, and vegetable matter are frequently added, and feathers of some size are constantly found in the stomach. The nest, a pile of aquatic weeds or rushes of varying bulk, is fixed among reeds, sedges, semi-natant masses of herbage, or, more rarely, upon low branches of trees or bushes verging upon the water. Should this rise higher, fresh materials are added. From three to six bluish-white eggs with a smooth chalky covering are laid in a slight depression above, but being covered with wet weeds by the female on leaving, soon become stained with brown. The bill is used in concealing them, nor does an invader's presence usually hinder the operation. Incubation lasts from twenty-one to twenty-four days. Both sexes are said to assist, and the mother carries the nestlings on her back, or even dives with them in that position.

Order III. SPHENISCIFORMES.

The Order Sphenisciformes, with its Sub-Order SPHENISCI, contains only those remarkable marine birds the Penguins (Fam. **Spheniscidae**), the life of which is chiefly spent on the stormy waters of the Antarctic seas. Coupled by former writers with the Auks, their northern analogues, it has now been shown that the slight external similarity of the two groups is utterly misleading, the nearest allies of the primitive forms here treated being the Petrels on the one hand and the Divers and Grebes on the other. Their unique structure is correlated with very peculiar habits.

[1] A. Newton, *Ibis*, 1889, p. 577.

The horny sheath of the maxilla is composed of from three to five more or less distinct pieces, while the powerful bill may be long, thin, and slightly decurved, as in *Aptenodytes* and *Pygoscelis*; shorter and pretty broad, as in *Eudyptes*; or very stout, short, and compressed, as in *Spheniscus*, where the prominent hook of the culmen overhangs a truncated mandible. The three metatarsals are not completely fused as in other birds (p. 10), the scutellated metatarsus itself being shorter and broader than in any other Family, except the Fregatidae; the legs are set far back, the tibia is hardly visible, and the short thick toes are directed forwards, the small hallux alone having no web. Even more striking are the wings, which are totally devoid of normally-developed quills, though the number of feathers is very large, the primaries themselves amounting to about thirty-six; these flippers or paddles have highly compressed bones with no power of flexure, but work freely from the shoulder in rotatory fashion, requiring a corresponding increase of strength in the muscles of the neighbouring parts. The numerous rectrices are fairly long and stiff in *Aptenodytes*, *Pygoscelis*, and *Eudyptes*, but shorter in *Spheniscus*, having considerably reduced vanes. On the body we find some naked tracts, with a pretty uniform covering of small feathers, with or without barbs, and an equally uniform distribution of down both in adults and young: the moult, moreover, is accomplished in an exceptional manner, the plumage being shed in masses, and that of the wing gradually flaking off above the new coat. The process apparently occupies about ten days.[1] Long superciliary crests occur in *Eudyptes*, the mandible is more or less feathered in *Aptenodytes* and *Pygoscelis*, and the metatarsi are clothed besides in *A. forsteri*. The furcula is U-shaped, the syrinx tracheo-bronchial, the tongue often rudimentary, an after-shaft is present, and the plentiful subcutaneous fat produces a marketable oil.

Penguins[2] have been said to derive their name from the Latin *pinguis* (fat) or the English "pin-wing," *i.e.* pinioned wing, but such nautical appellations are usually obscure. The French term them "Manchots." These birds rest on the whole metatarsus, the bill usually pointing upwards; their gait on land is ludicrous, but often fast, a vertical position being generally preserved, while they endeavour to waddle along on their toes with constant flapping of the pinions, every now and then partially losing their balance

[1] A. D. Bartlett, *P.Z.S.* 1879, p. 6.

[2] Cf. Gare-fowl (*Alcidae*), *infra*.

and regaining it by the aid of their flippers. Several species are called Rock-hoppers, from their manner of hopping upon the boulders. They are, however, rarely seen on land, except in the breeding season, though equally gregarious at all times, swimming in "schools" and resorting in vast numbers to their "rookeries." When submerged, the wings act as paddles with alternating rotatory action, and the feet as rudders; but on the return to the surface the latter naturally become the propellers. The note is a croak, a scream, a murmuring sound, or, in the young, a whistle. The food of crustaceans, cephalopods, and other molluscs, is varied by fish or a little vegetable matter, and accompanied by a mass of pebbles, often ejected near the breeding places. The nest of grass and leaves—more rarely of twigs, pebbles, clay or rubbish; when herbage is scarce—may be in burrows, among tussocks, under stones, in caves, or in the open; the two coarse-flavoured eggs being white or greenish-white, with a variable amount of chalky incrustation. The male is said to assist in incubation, which lasts about six weeks; the parents sit very closely and feed the blind young for an exceptionally long period, by inserting their bill in that of the nestling. Pugnacious and thievish towards one another, Penguins are usually fearless on land, though, when they are irritated, the beak can inflict a very severe bite.

The range extends southwards from the Galápagos round Cape Horn to the Falkland Islands, a few stragglers reaching Brazil; thence breeding stations are found eastwards in Tristan da Cunha, off the Cape of Good Hope, in the Crozets, Marion, and Amsterdam Islands, Kerguelen Land, and so on to the south of Australia and New Zealand, with the Antarctic regions as far as man has penetrated. The largest form is *Aptenodytes forsteri*, and the smallest *Spheniscus minor*, about 36 and 19 inches long respectively; the sexes are alike in colour, or the female may be a little duller and resemble the young. The bill and feet are usually reddish-brown, black or grey, but the latter may be whitish. The nestling in down is blackish- or yellowish-brown with white lower parts.

A. forsteri, the Emperor Penguin of Victoria Land and the adjacent seas, is blackish-grey, with white breast and belly and an oval yellow spot on each side of the head. It is particularly tame, and moves at a marvellous rate by lying on the snow and propelling itself with its feet.[1] *A. pennanti*, the King Penguin of

[1] P. L. Sclater, *Ibis*, 1888, p. 330.

Kerguelen Land, the Falklands, Crozets, Auckland, Macquarie, Campbell, and other southern islands, apparently confounded with the last-named under the title of *A. patagonica*, is distinguishable by the longer bill, more orange chest, and lack of feathers on the sides of the mandible and metatarsus. The crowded breeding grounds are flat spaces of hard soil covered with slime, and are often quite apart from the general quarters. When disturbed the birds utter a loud "urr-urr-urr," and run to the sea at a great pace, maintaining an upright position; while they pass to and from the water singly, and not in flocks, as do other species.[1] The pyriform eggs are sometimes held up by the parents' feet. *Pygoscelis taeniata*, the "Gentoo," of similar but more restricted range, is bluish-black above and on the throat, having the lower parts, the margins of the flippers, and a band across the crown white. Dense colonies are found both near the sea and several miles inland, a regular path being often beaten down by the birds traversing it in company: the nests consist of a little herbage in a hollow, or are small conical mounds of stones and clay, lined with feathers and down, the oval eggs being frequently of unequal size. The note is an unmelodious bark.[2] *P. adeliae* inhabits the icy regions of the far south.

Spheniscus demersus, the Cape Penguin or Jackass, ranging from western South America to South Africa, has bluish-black upper parts and throat, and white lower surface crossed by a blackish band—or two in the variety *magellanicus*. The note is a harsh bray; the eggs are either deposited in burrows—presumably dug by the parent itself—or, as on rocky islands near the Cape, in nests of pebbles and rubbish, commonly placed under large stones.[3] *S.* (*Eudyptula*) *minor* is a bluer species with white throat, that part being dark coloured in the whole Family except here and in *Eudyptes antarcticus*; it occupies the south of Australia and the New Zealand area. The note is a loud croak or growl, and the oval but somewhat pointed eggs are laid on a bed of leaves and grass in an excavation in the soil or a crevice among rocks.[4] *S. mendiculus*, the only tropical form, occurs in the Galápagos.

The genus *Eudyptes* contains the crested "Maccaroni" Pen-

[1] Cf. Moseley, *Rep. Voy. "Challenger," Zool.* ii. 1880, Birds, p. 123.

[2] Cf. Abbott, *Ibis*, 1860, p. 336; Sclater, *op. cit.* 1894, p. 501; and Eaton, *Phil. Trans.* clxviii. 1879, pp. 154-157.

[3] Cf. Abbott, *ut supra*, and Moseley, *op. cit.* pp. 124, 125.

[4] Buller, *Birds of New Zealand*, 2nd ed. 1888, p. 301.

guins or Rock-hoppers, of which *E. chrysocome*, figured below, extends southwards and eastwards from the Falklands through the Indian Ocean and Antarctic seas to the coasts of New Zealand and the neighbouring islands. It is bluish-black with white breast and belly, and a fine orange crest on each side of the crown, from which a broad golden streak passes over the eye to the base of the maxilla. *E. chrysolophus*, a rarer bird of somewhat similar range, has the forehead yellow instead of black. *E. chrysocome* nidificates on elevated slopes, usually near fresh water, in which it delights to bathe, the nest being either a mere depression in the

FIG. 17.—Rock-hoppers. *Eudyptes chrysocome*. (From Thomson's *Atlantic*.)

bare earth or a slight structure of plant-stems and leaves. This is at times perfectly exposed, but is not unfrequently among boulders or under the shade of tussocks of grass as high as a man's head, the filthy breeding-places being intersected by beaten pathways formed by the constant passage of troops to and from the sea. The parent is said to sit almost perpendicularly, with the eggs closely applied to a naked space in the centre of the abdomen, but it should be mentioned that some observers state that the breast is lowered until it nearly touches the ground, though there seems to be little doubt that the position is at least half upright in the case of Penguins generally. Like other species, Rock-hoppers swim chiefly below the surface of the sea, coming into view only

from time to time to breathe; but they have a most curious habit of stretching out the legs below the tail, laying their wings flat to their sides, arching their necks forward, and then making a sudden spring clear out of the waves. An occasional croak is heard while the birds are in the water, but on land the barking noise is perfectly deafening, nor do the severe bites with which the intruder is greeted make matters more tolerable.[1] Among other species recognised by different writers are *E. antarcticus* of the Falklands, South Orkneys, South Shetlands, and New Georgia; *E. antipodum* of New Zealand and Campbell Island, with an almost yellow head; *E. atratus* of the Snares Islands, entirely of a blackish hue, and possibly a melanistic form; *E. schlegeli* of Macquarie Island, *E. vittatus* and *E. pachyrhynchus* of New Zealand, *E. sclateri* of the Auckland Islands, and *E. serresianus* of Tierra del Fuego.

Palaeeudyptes antarcticus[2] is a fossil form nearly 7 feet high, from the Eocene of New Zealand, while Señores Moreno and Mercerat record *Paraptenodytes antarcticus*, *Palaeospheniscus patagonicus*, *P. menzbieri*, and *P. bergii* from the Miocene of Patagonia.[3]

Order IV. PROCELLARIIFORMES.

The Procellariiformes, or Petrels, are archaic ocean forms with great powers of flight, often placed near the Laridae on account of a supposed external resemblance, though the structure of the internal parts shews this to be misleading, and indicates rather a position between the Spheniscifornes and Ciconiiformes.

The single Sub-Order TUBINARES, with the Family *Procellariidae*, may be subdivided into the Sub-families: (1) *Diomedeinae*, or Albatroses; (2) *Oceanitinae* and (3) *Procellariinae*, or Fulmars, Shearwaters, and Petrels proper; and (4) *Pelecanoïdinae*, or Diving Petrels.[4]

Fam. **Procellariidae**.—In the larger species the bill is long, stout, and frequently compressed, with a strong sharp hook overhanging the truncated mandible; its size gradually diminishing throughout the Sub-families in very much the above order. The

[1] Cf. Moseley and Abbott, *ut supra*, p. 57.

[2] Huxley, *Quart. J. Geol. Soc.* xv. 1859, pp. 670-676.

[3] *An. Mus. La Plata, Pal. Argent.* i. 1891, pp. 16-19, 446.

[4] H. Gadow, Bronn's *Thier-Reich, Aves, Syst. Theil*, p. 129. For other classifications see W. A. Forbes, *Rep. Brit. Ass.* 1881, p. 671; and O. Salvin, *Cat. Birds Brit. Mus.* xxv. 1896, p. 342.

horny sheath is separated by grooves into more or less distinct plates, and the mandible may also be grooved, as in *Phoebetria*; while *Prion* is especially remarkable for the curious fringe of transverse lamellae on the margins of the broad maxilla, which recall those of the Duck tribe, traces of the same being exhibited by *Ossifraga*, *Fulmarus*, *Daption*, and *Halobaena*. The most striking peculiarity, however, is the tubular structure of the impervious nostrils, which trenchantly divides the Petrels from all other Birds; these tubes are far apart in the Diomedeinae, and lie laterally towards the back of the culmen; in the remaining groups they are fused together and are situated dorsally. In the Oceanitinae the single aperture looks forwards and upwards, but in the Procellariinae the septum is produced to the front, showing clearly the double nature of the formation; in *Pelecanoïdes* again the distinct openings are almost vertical, an arrangement as well adapted to the diving habits as are the long sternum and the compressed wing-bones. The rows of retroverted spines found on the palatal membrane in most of the family no doubt aid in the retention of slippery prey, as do the lamellae in *Prion*. The lower portion of the tibia is bare; the metatarsus varies in length and stoutness according to the species, though often decidedly slender, and is much compressed in *Puffinus* and its nearest allies. It is usually covered with hexagonal scales, but *Oceanites* and *Cymodroma* show but one long anterior scute (*ocrea*), while *Garrodia* and *Pelagodroma* have a series of oblique plates instead. The hallux is absent in *Pelecanoïdes*, and consists of only one phalanx elsewhere, being quite rudimentary in the Diomedeinae; it is slightly above the level of the anterior toes, which are connected by large webs. The claws are, as a rule, sharp, curved, and compressed, but are blunt and much flattened in *Pelagodroma*, *Pealea*, and *Cymodroma*, showing a similar tendency in others of the Oceanitinae. The wings are normally long, and are very narrow and pointed in the Diomedeinae, where the expanse is vast, but in *Pelecanoïdes* they are decidedly short: the primaries are eleven in number; the secondaries are ten or less in the Oceanitinae, thirteen or more in the remaining forms, and amount to more than thirty in some of the Diomedeinae. The tail is rarely long, as in *Phoebetria*, and may be even, rounded, graduated, or emarginated; the above species, *Bulweria*, and some forms of *Puffinus* have it wedge-shaped, while

a distinct fork occurs in *Oceanodroma*. Sixteen rectrices are found in *Ossifraga*, fourteen in *Fulmarus*, *Priocella*, and *Daption*, twelve elsewhere. The small tongue is somewhat triangular, being rather larger in *Ossifraga* and *Prion*; the syrinx is tracheo-bronchial; and an after-shaft is present, though in some cases rudimentary.

The soft, dense plumage shows various patterns of black, brown, grey, and white; the bill and feet may be black, brown, flesh- or horn-tinted, yellow, orange, or parti-coloured, but in *Prion* and *Halobaena* the latter are bluish. Light and dark phases are not uncommon, as in *Fulmarus* and *Ossifraga*; the sexes are invariably similar; and the nestlings, which long remain helpless, are clad in thick down of a black, brown, grey, or white hue, through which the feathers appear gradually. Some white Albatroses have intermediate dusky stages of plumage, and do not gain the adult coloration at once, as most of the Family seem to do.

Diomedea exulans is one of the largest birds that fly, exceeding a goose in size, while the smaller Petrels are hardly bigger than Finches. The range of the Order is world-wide, though a majority of species frequent the desolate tracts and islands of the southern oceans; but even Albatroses breed in the North Pacific.

Though the members of this Family can hardly be called gregarious, flocks of Shearwaters, Fulmars, and so forth are by no means an uncommon sight from shipboard, and settlements are formed in the breeding season, which is almost the only occasion on which they voluntarily seek dry land. Albatroses, Fulmars, the "Cape Pigeon" (*Daption*), and other allied forms are observed most commonly in the daytime, whereas those that nest under cover are to a great extent nocturnal during incubation, and are generally seen or heard after dusk. While the whole group is oceanic, there is a wide difference between the powerful Albatros and its smaller and weaker relations in that respect, the latter journeying but little from the immediate neighbourhood of their homes, and not accompanying ships for long distances in the same way as the former. In the larger species the flight is strong and graceful,[1] accompanied by circling, soaring, or sailing movements, the feet being extended below the tail; Shearwaters skim the waves in a curious twisting fashion, and the lesser Petrels flit with greater action of the wing close to the

[1] Here the late Professor Roy's article on "Flight" (A. Newton, *Dict. Birds*, 1893, p. 260) may be consulted.

surface, upon which they paddle to assist themselves. The Diving Petrels—and their allies to a limited extent—plunge through or beneath the billows, while all species may be noticed at times resting or swimming upon the water. Equally at home in storm or calm, they pass the greater part of their lives upon the ocean, and it seems impossible to doubt the fact that they sleep there also. Great difficulty is experienced in rising from a level surface, whether it be the deck of a ship or a grassy flat; the birds scrambling along with flapping wings and occasional aid from the bill, until some slight declivity or broken edge enables them to obtain a start. When taken from a nest in a burrow, they either drop to the ground like stones, or flutter off in a dazed condition, which lasts for several seconds, and renders them absolutely helpless. The cry is said in various cases to resemble a bray, a croak, a harsh cackle, a diabolical scream, a puppy's whine, or a soft whistle, while the twittering or "singing" of *Procellaria*, *Oceanodroma*, and *Oceanites* in their holes is well known to those who have visited a Storm Petrel's colony. The food consists of fish, crustaceans, cephalopods and other molluscs, jellyfish, and the like, Albatroses and Fulmars being said to force other species to part with their booty after the manner of Skuas, or even to devour nestlings. Herbage is rarely found in the stomach, but blubber of dead animals and scraps thrown from shipboard are eagerly swallowed, so that many of the largest forms are captured by concealing a hook in a piece of pork and trailing it in the water on a cork, when the bait is often greedily contested by every individual in the vicinity. Albatroses and other members of the Family which will take food from the surface of the sea descend upon it with elevated wings, to rise again with the morsel obtained, or to float upon the waves while enjoying it; Shearwaters commonly dash down with considerable impetus, and disappear after their prey for the moment; while the Diving Petrels procure their nourishment at a much greater depth. When handled, and perhaps especially when taken from a nesting-hole, the birds bite severely, and eject a quantity of amber-coloured or greenish oil from the beak, followed as a rule by semi-digested food, the fluid possessing a strong smell of musk, which is also perceptible in the feathers and the eggs. The nest of the Albatros is usually a truncated cone or cylinder of mud, grass, leaves, and moss, with a slight

depression on the top, colonies being formed on cliffs, rocky slopes, or bare hill-tops above the limit of trees; the Giant Petrel makes a similar structure at no great elevation; Shearwaters and their nearest allies collect a mass of grass and rubbish in a burrow scraped in a bank, among boulders, or in holes and crevices of rocks, accommodating themselves to little stone huts, provided by the fishermen, in the Canary and Salvage Islands.[1] Fulmars scrape a cup-shaped hollow on ledges of precipices, adding little or no lining, while most of the remaining forms utilise small burrows, or crannies among the scattered stones which collect upon the shores or at the base of cliffs. A single lack-lustre white egg is deposited, frequently marked with a ring of rusty spots towards the larger end, especially in the case of the lesser species. Adult and young Shearwaters are eaten by the natives of the Canaries, the islands of Scotland, Ireland, and elsewhere, *Puffinus brevicauda* being the "Mutton-bird" of Australia, and *P. anglorum* being termed "Fachach" in the Hebrides and North Ireland. In the case of *Pelagodroma*, we have positive evidence that both sexes incubate;[2] and before the eggs are laid the parents are not uncommonly found together in the hole when such a site is chosen. Incubation lasts from twenty-five to sixty days.

Sub-fam. 1. *Diomedeinae*.—This contains two genera, *Phoebetria* and *Diomedea*, of which the former has one member, *P. fuliginosa*, of a sooty grey colour, distinguished from its allies by the sulcated mandible and cuneate tail. It frequents the South Seas, while straying to Oregon, as does *Diomedea culminata*: and has similar manners to other Albatroses. *Diomedea exulans*, the "Wandering Albatros," or "Cape Sheep," of the Southern Oceans generally, is white with narrow dusky undulations above and almost black wings; and particulars of the habits having been already given, it only remains to refer to the majestic flight, described by Professor Hutton as follows: "With outstretched, motionless wings he sails over the surface of the sea, now rising high in the air, now with a bold sweep, and wings inclined at an angle with the horizon, descending until the tip of the lower one all but touches the crests of the waves as he skims over them. Suddenly he sees something floating on the water and prepares to alight: but how changed he now is from the noble bird but a moment before all grace and symmetry. He raises

[1] Ogilvie Grant, *Ibis*, 1896, p. 52. [2] *Id. ibid.*

his wings, his head goes back, and his back goes in; down drop two enormous webbed feet straddled out to their full extent, and with a hoarse croak, between the cry of a Raven and that of a sheep, he falls 'souse' into the water. Here he is at home again, breasting the waves like a cork. Presently he stretches out his neck, and with great exertion of his wings runs along the top of the water for seventy or eighty yards, until, at last,

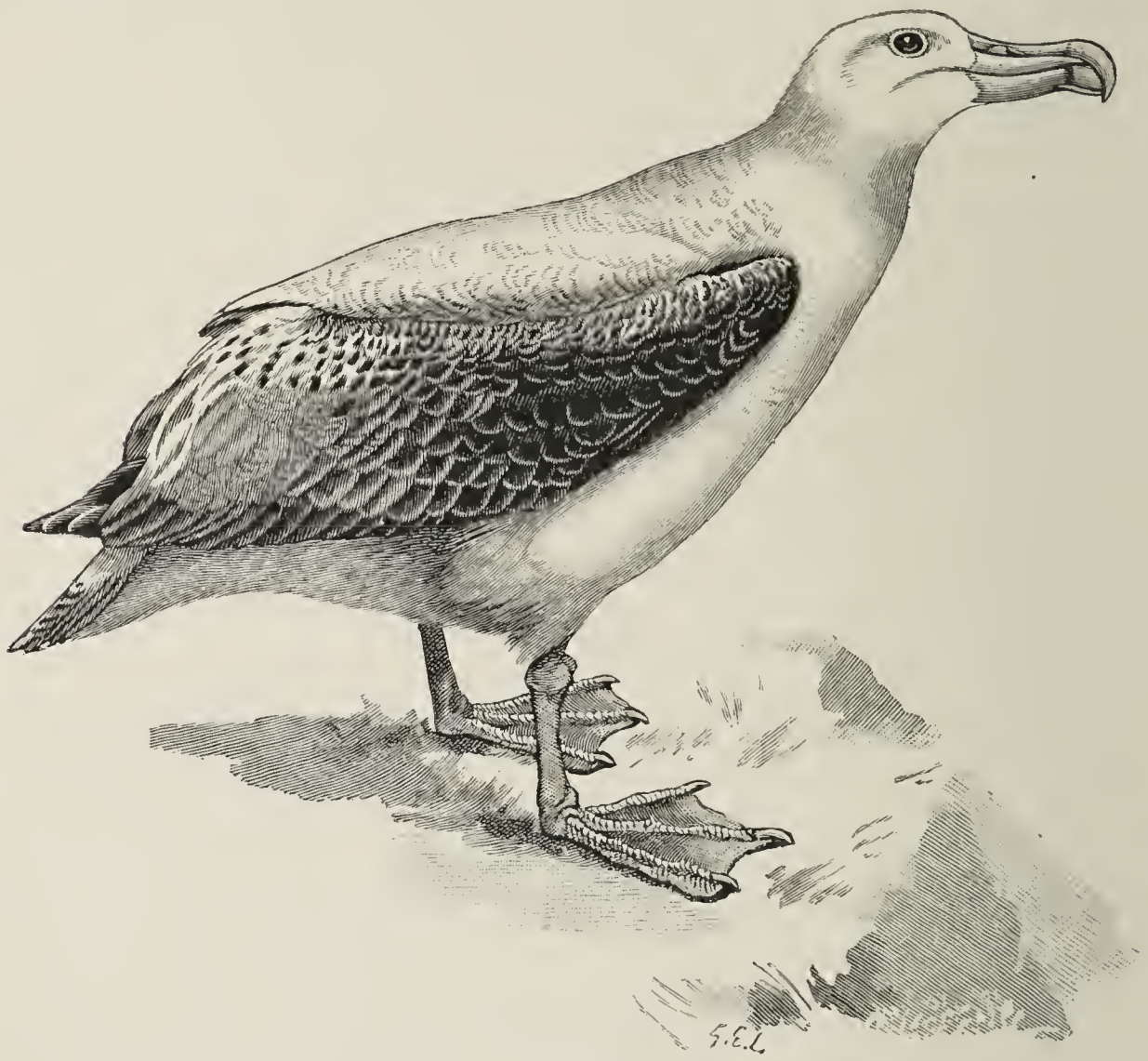

Fig. 18.—Wandering Albatros. *Diomedea exulans.* $\times \frac{1}{9}$.

having got sufficient impetus, he tucks up his legs, and is once more fairly launched in the air."[1] *D. regia*, of the New Zealand seas, has no undulations on the back; the similar *D. chionoptera*, of the Southern Indian Ocean, has nearly white wing-coverts; and *D. albatrus*, of the North Pacific, has buff crown and nape. Of the smaller forms, or Mollymauks (p. 65), *D. irrorata*, of West Peru, is sooty-brown with plentiful white mottlings and white head; *D. nigripes*, of the North Pacific, is the same colour, but shews white only at the base of the tail

[1] *Ibis*, 1865, pp. 281, 282.

and bill, and near the eye; *D. immutabilis*, found from Laysan to Japan, is darker, with white head, neck, rump, base of tail, and lower parts: *D. melanophrys*, of the southern oceans, which has occurred in California, and in summer in England as well as at the Faeroes,[1] is white, with a blackish band on each side of the eye, slaty back, brownish-black wings, and grey tail; *D. bulleri*, of the New Zealand seas, is greyish-brown, with white rump and lower surface, and ashy or whitish head; *D. culminata* and *D. chlororhyncha*, of the southern oceans, *D. cauta* of Tasmania, *D. salvini* of the New Zealand Seas, and *D. layardi* of those of the Cape, have similarly coloured plumage; the last five being distinguished by some writers as *Thalassogeron*, and having a strip of naked skin between the plates of the maxilla towards its base. *D. bulleri* has red, *D. chlororhyncha* flesh-coloured, and the others yellow feet; the amount of yellow on the bill varying with the species.

Sub-fam. 2. *Oceanitinae.*—The genera recognised are *Cymodroma*, *Pealea*, *Pelagodroma*, *Garrodia*, and *Oceanites*; they are sooty- or slaty-black birds, of small size, having in some cases the rump, under parts, nuchal collar, forehead, superciliary streaks, or margins to the feathers of the dorsal region white. Their range extends over different portions of the southern seas, whence *Oceanites oceanicus*, Wilson's Petrel, has strayed to Labrador and Great Britain, and *Pelagodroma marina* to the latter and Massachusetts, while breeding in the Salvage Islands south of Madeira and the Cape Verds. The habits do not seem to differ appreciably from those of the Storm-Petrel.[2]

Sub-fam. 3. *Procellariinae.*—As here arranged, this comprises three groups typified by the Fulmars, Shearwaters, and Storm-Petrels respectively. Of the first, *Ossifraga gigantea*, the Giant Petrel, or "Nelly" of the southern seas, recorded also from Oregon, is dark brown, often with white on the head when immature, and sometimes almost entirely white. *Fulmarus glacialis* of the North Atlantic, the Fulmar of St. Kilda, and the true Mollymauk of sailors, which is represented in the North Pacific by the barely separable *F. glupischa* and *F. rodgersi*, is bluish-grey with dusky quills, white head, neck, and lower parts; the dark phase being uniform dusky grey. It is smaller

[1] Harvie-Brown, *Zoologist*, 1894, p. 337-338.

[2] Eaton, *Phil. Trans.* clxviii. 1879, pp. 129-134; Ogilvie Grant, *Ibis*, 1896. pp. 51-53.

than *Ossifraga*, yet equal to a medium-sized Gull, though easily distinguished by its light gliding flight with little motion of the wings; in rough weather it skims very near the waves, while the croaking note is seldom heard. *Daption capensis*, the "Cape-Pigeon," ranging from Ceylon and Peru throughout the southern oceans, is black and white above and nearly white below; it is well known as a constant companion of ships, especially off South Africa, hovering or swimming around, uttering its harsh cackle, or plunging into the water to fight for scraps thrown overboard. *Halobaena caerulea*, extending from lat. 40° to 60° S., is grey-blue above and white below, with a little white on the head, scapulars, and tail; the habits resemble those of *Prion*, a genus of four species, remarkable for the fringe of lamellae on the bill, and having blue-grey upper parts varied with black, white under parts and superciliary streak. These forms are found throughout the southern seas, while *P. ariel* has occurred in Madeira. *P. desolatus*, the Whale-bird of sailors, is frequently seen flitting round vessels, uttering its whistling or cooing note, or taking food from the water upon the wing; the slight nest is formed in an extremely small burrow.

Little object would be served by describing in detail the twenty members of *Puffinus* (Shearwater) or the thirty of *Oestrelata*, the main constituents of our second group of Procellariinae. The former are sooty-brown or greyish, commonly with white below, and in some cases with white or pale edges to the feathers above; all are much alike except the uniform species, but it should be carefully noted that Petrels are often best distinguished by the colour of the bill and feet. The habits of these birds, which are distributed throughout the greater part of the world, have been already sufficiently treated. *P. anglorum*, the "Manx" Shearwater, breeds along the west of Great Britain, in the Orkneys, Shetlands, and Ireland, *P. major* or *gravis*, *P. griseus*, *P. obscurus*, *P. assimilis*, and *P. yelkouanus*, the "âme damnée" of the Bosphorus, being occasional visitors to our shores. In *Oestrelata* the coloration is grey, brown, or blackish, with a decided tendency to lighter margins on the upper feathers, and in a few of the members more or less white on the tail, wing, or head; the under parts, moreover, being frequently white. The various forms reach from the southern temperate regions to Japan and also to Britain, where *Oe. haesitata* and *Oe. brevipes*

have each been recorded once. The latter breeds on mountain-tops in islands, and of its other congeners some at least do likewise, many having an extremely limited range at all seasons.

Priofinus cinereus, the "Night-hawk," perhaps more noisy at night than even certain Shearwaters, is greyish-brown above and white below; it inhabits the southern oceans. *Thalassoeca antarctica*, restricted to the Antarctic regions, is brown with white lower parts and some white on the wing, tail, and their coverts. *Priocella glacialoïdes* of the southern seas, which ranges northwards to Washington State in the Pacific, and seems to have the habits of a Fulmar, resembles that bird in its pearl-grey hue, with nearly white head, neck, and under surface. *Majaqueus aequinoctialis* of the regions south of lat. 30° S., known as the "Cape Hen," is sooty-black with a white chin, *M. parkinsoni* of New Zealand being uniform in tint. The cry is a soft whistle, but the manners are in other respects as in Shearwaters, except that a conical nest is constructed in a burrow, whence a curious cackling noise issues during the period of incubation.[1] *Pagodroma nivea*, of the icy regions of the south, is pure white with black bill and yellowish feet; it remains on the wing until late at night, and resembles *Prion* generally in its ways. *Bulweria bulweri*, met with once in England, inhabits the temperate parts of the North Atlantic and the North Pacific, and breeds as near us as the Desertas; it is almost uniform sooty-brown, and has the habits of a Storm-Petrel rather than of a Shearwater, being bold but wary, and rapid in flight, with a loud, cheerful quadruple note. It lays its pure white eggs without any nest in crevices of rocks, breeding as late as June near Madeira. *B. macgillivrayi*, with stouter bill, is known from the Fijian waters.

Our third group includes the true Storm-Petrels (*Procellaria*) and their close allies the Fork-tailed Petrels (*Oceanodroma*), as well as *Halocyptena microsoma*, a dark blackish bird from Western America, between California and Panama. *P. pelagica* of the Mediterranean and North Atlantic from Greenland to South Africa, which breeds in Scotland, Ireland, and the West of England, is sooty-black with the tail-coverts white, except at the tips, and a little white on the wing-coverts. Named "Mother Carey's Chicken" by sailors, who look upon it with superstitious dread, it is often seen paddling along the waves in

[1] Eaton, *Phil. Trans.* clxviii. 1879, p. 121.

stormy weather, thus gaining the name of "Petrel" from the Apostle Peter; while it may be heard singing among the boulders towards the end of June in Scotland, where it breeds more than a month later than the "Lyrie" or Manx Shearwater. The note is shrill and the flight somewhat butterfly-like. *P. tethys*, of the Galapagos and Western Central America, has entirely white tail-coverts. *Oceanodroma* contains ten members inhabiting the northern hemisphere, and ranging southwards to Peru and St. Helena, all being sooty-black except *O. furcata*, which is chiefly ashy-grey, and *O. hornbyi*, which is brown, with white collar, forehead, and under surface, and blacker head and wings. *O. leucorrhoa* (Leach's Petrel) and *O. cryptoleucura* possess

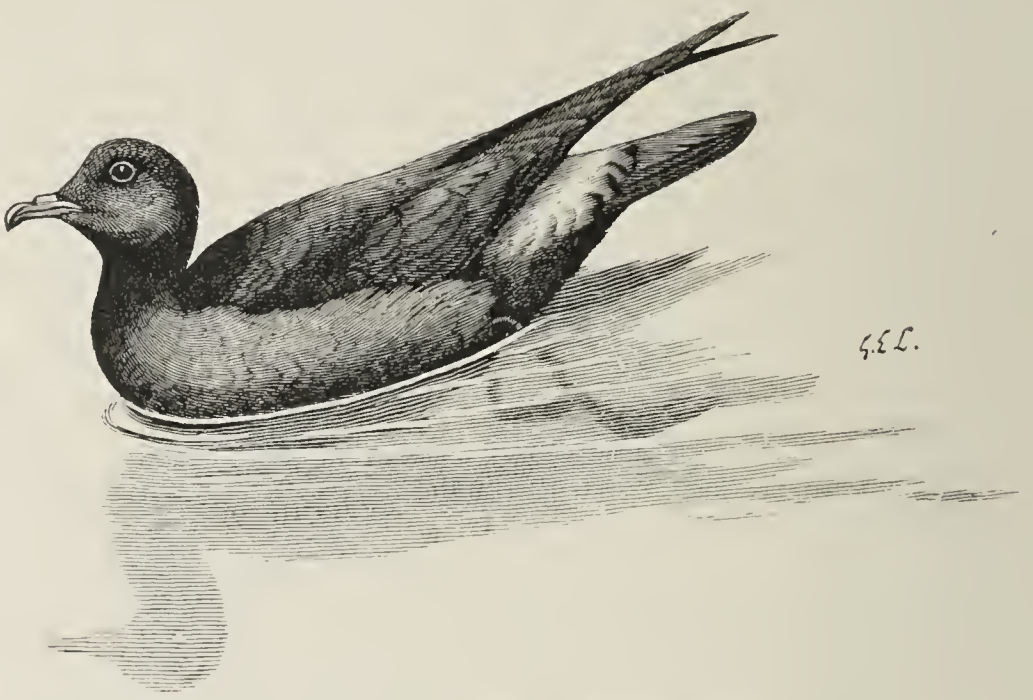

FIG. 19.—Storm-Petrel. *Procellaria pelagica*. $\times \frac{2}{3}$.

white tail-coverts tipped with black; the former having some breeding stations in Britain at St. Kilda and a few islands on the west of Scotland and Ireland, and the latter as far north as Madeira, though it extends to St. Helena, the Galapagos, and the Sandwich Islands, and has recently occurred in England. The other species are apparently met with only in the Pacific north of Panama, while in habits the genus is not dissimilar to *Procellaria*.

Sub-fam. 4. *Pelecanoïdinae*.—These Diving-Petrels include *Pelecanoïdes urinatrix*, of the vicinity of Australia, New Zealand, Cape Horn, and the Falkland Islands, a glossy black bird with white under parts, some grey on the sides of the neck, and grey and white on the scapulars; *P. exsul*, of the Southern Indian Ocean, with grey throat; and *P. garnoti* of Western South America,

which is larger and quite white below. Of the first Darwin says [1] that it "never leaves the quiet inland sounds. When disturbed it dives to a distance, and, on coming to the surface, with the same movement takes flight. After flying by the rapid movement of its short wings for a space in a straight line, it drops as if struck dead, and dives again." The egg is deposited in a small burrow; the note is a cackle or moan.

Fossil remains are recorded from the Pacific, Australia, and New Zealand, which are referred to the genera *Puffinus*, *Ossifraga*, and *Diomedea*, and probably belong to existing species; *Puffinus conradii* is from the American Miocene, *P. eyermani* from Tavolara, off Sardinia; but a much more remarkable fact is the discovery in the Suffolk Red Crag of portions of a distinct form, named *Diomedea anglica* by Mr. Lydekker.[2]

[1] *Voy. "Beagle"* (1890 ed.), p. 351.
[2] *Quart. J. Geol. Soc.* xlii. 1886, pp. 366, 367.

CHAPTER IV

NEORNITHES CARINATAE *CONTINUED*

BRIGADE I—LEGION II (PELARGOMORPHAE). ORDERS: CICONIIFORMES—ANSERIFORMES—FALCONIFORMES

Order V. CICONIIFORMES.

THE Order Ciconiiformes is a somewhat unwieldy assemblage consisting mainly of Water-birds, which may be classed under the Sub-Orders STEGANOPODES, ARDEAE, CICONIAE, and PHOENICOPTERI. Of these the first contains the *Phaëthontidae* or Tropic-birds, the *Sulidae* or Gannets, the *Phalacrocoracidae* or Cormorants and Darters, the *Fregatidae* or Frigate-birds, and the *Pelecanidae* or Pelicans; the second the *Ardeidae* or Herons and Bitterns, and the *Scopidae* with the Umbrette; the third the *Ciconiidae* or Storks and "Wood-Ibises," and the *Ibididae* or true Ibises and Spoon-bills; while the fourth comprises the *Phoenicopteridae* or Flamingos, and the extinct genus *Palaelodus*, for which Dr. Gadow recognises a separate family *Palaelodidae*. Among these the greatest affinity to the *Procellariiformes* is exhibited by the *Steganopodes*, whereas the *Phoenicopteri* are so closely allied to the *Anseriformes* that not a few writers prefer to include them in that Order.

The STEGANOPODES are aquatic and chiefly marine birds, so far homogeneous in structure that the details may well be set forth in common; while in some points they bear a great resemblance to the *Cathartidae*.[1] Each Family contains a single genus, except the *Phalacrocoracidae*, where *Phalacrocorax* and *Plotus* may be considered the equivalents of Sub-families.

The sternum is long, especially in *Sula*, while the large head and short thick neck of *Phaëthon* and *Fregata* may be contrasted with the small head and remarkably long neck of *Phalacrocorax*, and still more of *Plotus*; *Sula* and *Pelecanus* being moderate in

[1] H. Gadow, Bronn's *Thier-Reich*, *Aves*, *Syst. Theil.* 1893, p. 135.

both respects. The bill, which is more or less compound, is long, pretty straight, and generally compressed: in *Phaëthon* and *Sula* it is strong, conical, and pointed; in *Phalacrocorax* either stout with a long hooked nail, or less robust with the hook at the tip shorter, the sides being scabrous; in *Fregata* similar, in *Plotus* slender and tapering, in *Pelecanus* weak, much flattened, hooked, and scaly. The maxilla is furrowed in *Sula*, *Pelecanus*, and *Phalacrocorax*, with the median part concave in the latter, while the cutting edges of both mandibles are serrated in *Phoëthon*, *Sula*, and *Plotus*. The legs are placed far back, especially in *Phalacrocorax*, the tibiae being partly bare in *Phaëthon* and *Pelecanus*, but feathered in the other forms, of which *Fregata* has the clothing continued to the toes. The metatarsus is short, stout, and compressed, that of *Fregata* being extremely abbreviated, as in the Spheniscidae; it is entirely covered with hexagonal scales, becoming almost reticulated behind, while the toes exhibit distinct transverse scutes in *Phalacrocorax*, and have a similar tendency elsewhere. The hallux, which is somewhat elevated in *Phaëthon*, is turned inwards or forwards, and is connected with the remaining toes by full webs, except in *Fregata*, where the membranes are excised to about half their extent; this unique "Steganopodous" foot giving the name to the whole group. The stout curved claws—weaker in *Fregata* —are of medium length, that of the middle digit being serrated on the inner side in the last named, *Sula*, and *Phalacrocorax*. The wings are long and pointed, reaching their maximum in *Fregata*, their minimum in *Phalacrocorax*, and having a very ample spread in *Sula* and *Pelecanus*. There are eleven primaries, and from fifteen to twenty-nine incurved secondaries, which may even exceed the former. In *Pelecanus* the short, broad, roundish tail consists of from eighteen to twenty-four soft acute rectrices, but in the remaining genera the feathers are strong and stiff, being particularly rigid in *Phalacrocorax* and *Plotus*: *Phaëthon* has sixteen, which are moderate and graduated, with a long filiform median pair in the adult; *Sula* and *Phalacrocorax* from twelve to fourteen in a more or less wedge-shaped formation; *Fregata* twelve, arranged in a fork; while *Plotus* has the same number, forming a fan, the webs being very broad and showing curious transverse corrugations in mature birds, found also on the scapulars. The tail is fairly long in the four last

mentioned, except in some members of *Phalacrocorax*. The V-shaped furcula ancyloses with the sternum in some of the Sub-Order, but *Fregata* differs from all other ornithic forms in the fact that the furcula also coalesces with the coracoids at its extremities, while the coracoids again unite firmly with the scapula, producing an almost rigid framework, considered by Professor Newton to be connected with the power which the bird possesses of sustaining itself nearly motionless in the air.[1] The peculiar angular articulation of the long eighth cervical vertebra in *Plotus*, which causes the Z-shaped "kink" in the neck, must also be noticed here.[2] The tongue is rudimentary ; the nostrils are pervious in *Phaëthon*, impervious elsewhere, being practically obliterated in adults ; the syrinx is tracheo-bronchial, except in *Sula* and *Pelecanus*, where the usual muscles are entirely absent. The subcutaneous air-cells of *Sula* are most remarkable. The newly-hatched young are blind and helpless, being naked and covered with blackish skin in *Sula*, *Phalacroeorax*, *Plotus*, and *Pelecanus*, though they soon acquire a white downy coat ; in *Phaëthon* and *Fregata* they are similarly clothed on breaking the shell. The down of the adults is uniformly distributed, the aftershaft is diminutive or wanting. The gular sacs, horny excrescences on the beak, crests, and so forth, are noted below.

Fam. I. **Phaethontidae**.—*Phaëthon aethereus*, *P. flavirostris*, and *P. rubricauda* are chiefly found in the tropical regions of the south ; but the first two species breed about as far north as the tropic of Cancer, while they frequent the West Indies, and occasionally stray to the Eastern United States, or even Newfoundland.[3] The first and third are found nesting northwards to Laysan. All these Tropic- or Boatswain-birds, as they are denominated, have satin-like white plumage—often with a tinge of pink—varied by blackish bars or patches above, and black marks near the eye ; the bill is red, or in *P. flavirostris* yellow, the metatarsi yellowish and the toes chiefly black. In *P. rubricauda* the long stiff median rectrices are dull red with black shafts and very narrow webs, in *P. flavirostris* they are pinkish with similar shafts, and in *P. aethereus* entirely white. The sexes are alike, the young being more irregularly marked and having no long tail-feathers.

The members of this Family are true denizens of the ocean,

[1] A. Newton, *Dict. Birds*, 1893, pp. 293, 294.

[2] W. A. Forbes, *P.Z.S.* 1882, pp. 208-212.

[3] The East American form of *P. flavirostris* is separated as *P. americanus* by Mr. Ogilvie Grant, *Bull. Ornith. Club*, vii. 1897, p. xxiv.

often met with many hundred miles from land; they will then hover constantly about a vessel, or even alight fearlessly on the rigging. They traverse the air with rapid sweeping flight, accompanied by constant quick pulsations of the wings: at one time soaring aloft to wheel in circles, at another plunging into the water from an immense height, though appearing again in a moment to float upon the surface. Their gait on land is shuffling, while they can hardly rise from level ground: the note is a harsh croak or chatter; the

Fig. 20.—Tropic Bird. *Phaëthon aethereus.* $\times \frac{1}{8}$.

food consists of fish, squids, and other produce of the sea. No nest is made, but a single reddish-brown or buff egg, with spots and frecklings of red-brown, purplish or grey, is deposited in a hole or crevice in a cliff, among rocks, or even in a cavity in a rotten tree, both sexes assisting in incubation.[1] The parents sit very closely, screaming, pecking, and snapping when disturbed; in some places they are habitually caught while breeding, and deprived of the long tail-feathers, which are used for decorations.

Fam. II. **Sulidae**.—*Sula bassana*, the Gannet or Solan Goose, which nests at several stations off the west of Great Britain, in Ireland, and on the well-known Bass Rock, extends thence to Iceland, and down the American coast to Nova Scotia, while it strays to Greenland, and in winter reaches the Gulf of Mexico and northern Africa. The plumage is white, with a buff tinge on the head and neck, and black primaries; the bill is whitish, the feet dusky, and the naked skin round the eye and down the centre of the throat blackish-blue. *S. capensis* of South Africa and *S. serrator* of Australia are similar to the above, but the former has the rectrices black, the latter the four median feathers blackish-brown.

[1] *Cf.* E. Newton, *Ibis*, 1861, pp. 180, 276; Layard, *op. cit.* 1863, p. 248.

The remaining species, often called "Boobies," have the whole lower jaw and throat bare. Of these *S. cyanops*, common in the South Pacific and ranging through the intertropical seas to the Bahamas in summer, is white with sooty-brown remiges, the wing-coverts and the lateral portion of the tail being partly of the same colour; the bill is yellow, the feet are reddish, and the naked parts bluish. *S. leucogaster*, extending from tropical and sub-tropical America over the Pacific, Indian, and Atlantic Oceans,[1] has the upper parts and chest brown, the remaining lower surface. and occasionally the head and neck, white: the

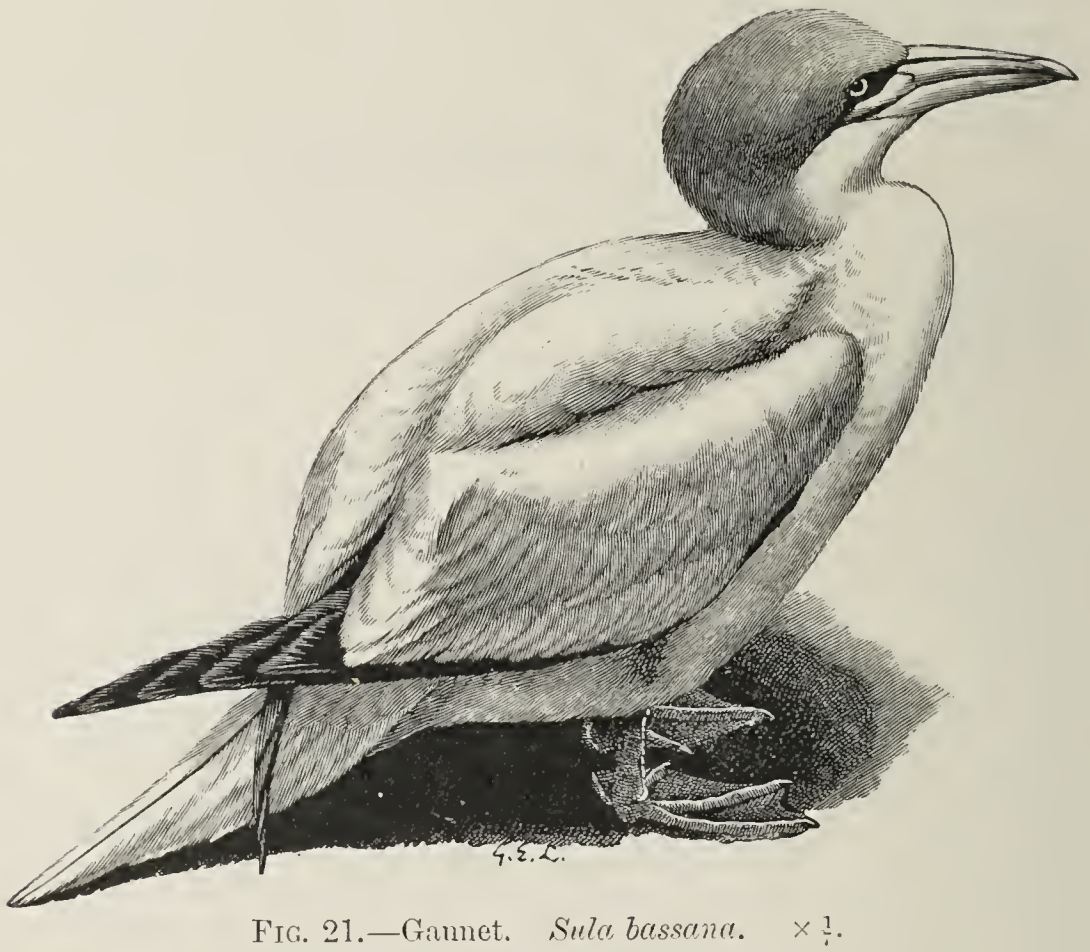

FIG. 21.—Gannet. *Sula bassana*. × $\frac{1}{7}$.

bill is yellow, the feet are greenish or yellowish, the bare skin is tinged with red or yellow. *S. piscator*, chiefly of the intertropical seas, resembles *S. bassana*, but has slate-grey wing-quills, purplish-grey bill, reddish feet and naked parts. *S. variegata*, of the shores of Chili and Peru, is dark grey-brown with white head, neck, and under parts, and white markings above. *S. abbotti*, of Assumption Island, north of Madagascar, is allied to *S. cyanops*. In this Family the sexes are alike, while the young are usually dusky with white streaks and spots; but those of *S. cyanops* are white below, and those of *S. leucogaster* and *S. piscator* chiefly sooty-brown, with

[1] Cf. Seebohm, *Birds of the Japanese Empire*, 1890, p. 212.

grey head, neck, and under surface in the latter. It apparently requires six years to attain the full adult plumage.

Gannets are oceanic birds, only frequenting the land in stormy weather; they traverse very great distances, and the northern species move southward in winter. The flight is easy and powerful, with alternate flapping and sailing motion, the head being carried in a line with the body and the feet drawn up. The food consists of surface-swimming fish, squids, and the like, while the young obtain their nutriment by thrusting their bills into those of the parents, though it is disgorged for them when newly hatched. The prey is chiefly captured by diving, the plunge being made with great velocity from a considerable height and the body being submerged for several seconds; on coming to the surface the bird generally remains quiescent for a short time before again taking to the air, but occasionally swims for a longer period. When diving the wings are kept open until the last moment, and are then quickly closed. Gannets find the same difficulty in rising from a level spot as do Tropic-birds, and are less prone to perch than many other sea-birds. The note is a hoarse reiterated sound or, less commonly, a plaintive cry, much noise being often made by the large colonies when breeding. The nest is a mass of sea-weed and grass, placed on a ledge of some high cliff, on the top of a stack, or even on a low tree; while the eggs—never more than two in number—are occasionally deposited on the bare sandy beach, and are greenish-blue, thickly coated with a white chalky substance, which soon becomes soiled. Incubation lasts about six weeks. The adults, especially in the case of the Boobies, are often absurdly fearless on land, while the female, when on the nest, grunts at an intruder, and pecks or bites sharply. They are frequently caught on shipboard by fixing bits of fish on floating pieces of wood, in which the beak is transfixed by the violence of the plunge; they do not, however, afford palatable food, though in Scotland the Solan Goose is half-roasted and so preserved for eating.

Fam. III. **Phalacrocoracidae**.—The genus *Phalacrocorax* includes the Cormorants and Shags, birds of similar coloration, which differ chiefly in the brilliancy of their metallic hues and the proportion of white to black or brown in the plumage, the following examples giving a fair idea of the whole. *P. carbo*, the Common Cormorant, with fourteen rectrices, has the head and neck glossy blue-black, interspersed with white hair-like feathers,

the remaining upper parts bronzy-black, the throat white, the bill and feet grey-black. In spring a slight crest adorns the occiput and white patches appear on the thighs. In common with its congeners this species has naked lores, orbital and gular regions, which are here of a yellow colour, becoming redder below the eye; the iris is emerald-green. The skin of the throat is dilatable and forms a pouch for food. It breeds on most of the British coasts, except between the Humber and the Thames, and occasionally inland; while it ranges to Greenland northwards,

FIG. 22.—Cormorant. *Phalacrocorax carbo.* $\times \frac{1}{8}$.

and thence down the Atlantic to New Jersey in the west, and to North and even South Africa on the east, as well as through Europe and Asia. The Australian and New Zealand *P. novae hollandiae* is doubtfully distinct. *P. dilophus*, of which several forms occur on the shores and in the interior of North America as far south as Mexico, is not unlike *P. carbo*, but has a tuft of long narrow recurved plumes on each side of the crown in the nuptial dress, which are black, white, or particoloured according to the locality. The bare loral region and gular sac are orange, and no white is visible on the throat or flanks. The splendid *P. pelagicus*, on the contrary, has white flank-patches in addition to white filaments on the neck and rump, the head and

neck are violet-black, and a bronzy-purple tinge extends thence to the wings, the naked areas being brownish-red. It ranges from Kamtschatka to Western Mexico, and even winters in North Japan. *P. urile*, of the extreme north of the Pacific, is very similar, but has the gular pouch bluish with red hinder margin, the lores, orbits, and an additional strip of bare skin on the forehead being orange. *P. perspicillatus*, of Bering Island, now considered extinct, is another close ally, in which the filamentous feathers are yellowish and the orbits white. *P. graculus*, the Green Cormorant or Shag, breeding in Britain chiefly on the western side, and occurring rarely on our inland waters, is found in many places along the coasts of West Europe to Morocco and the Mediterranean; it is dark green with black remiges and twelve black rectrices, and metallic hues on the head, neck, and under surface, the irides being green and the bill and feet black, as are the naked regions, which are spotted with yellow. In spring a recurved crest overhangs the forehead. *P. lucidus*, of South, East, and apparently West Africa, differs from the last in having a brown head and nape, and grey tints on the mantle and tail, while the chin and most of the lower parts are white. *P. africanus* occupies South and East Africa. *P. varius*, of New Zealand, is greenish-black above with grey middles to the dorsal feathers, white cheeks and under surface; the bill being horn-coloured, the feet black, the orbits bluish, the gular skin yellow, with an orange spot before each eye. *P. carunculatus*, of New Zealand, has, according to Sir W. L. Buller,[1] no crest and a white band on the back, but otherwise resembles the crested *P. onslowi* of the Chatham Islands, and *P. imperialis* of Chili and Patagonia,[2] two fine iridescent species with the under surface and an alar bar white, the bare papillose skin in front of the eyes orange-red, and the bill and feet brownish. *P. featherstoni* of the Chatham Islands, which is remarkable for possessing both an occipital and a frontal crest, is greenish-black and brown above with white filoplumes on the nape, and greyish-white below; the beak being dark brown, the feet orange-yellow, and the naked parts bluish. Similar tufts are met with in *P. punctatus* of New Zealand, wherein the upper plumage is mainly brown with terminal black spots on the

[1] *Birds of New Zealand*, 2nd ed. ii. London, 1888, pp. 154-160.

[2] The Chatham Island bird is *P. onslowi* of H. O. Forbes (*Ibis*, 1893, p. 537), who discusses various other species. The American forms need further study.

feathers, the thighs show a few white markings, and a broad white stripe reaches from above the eye down each side of the neck, where the coat is somewhat elongated and silky. *P. pygmaeus*, the Pigmy Cormorant, which breeds across South-East Europe and South Asia to Java and Borneo, as well as in North Africa, is greenish-black with greyer mantle, reddish-brown head and neck, and small white spots on the lower surface, the naked parts being black. The sexes in *Phalacrocorax* are alike, or nearly so. The young are browner above—with little of the characteristic gloss—and brown, or white mottled with brown below, the bill and irides often differing in colour from those of the adult.

The members of this family as a rule frequent salt water, yet not uncommonly breed on inland lakes and swamps, especially in the proximity of trees; they are often to be seen in companies, and are decidedly shy and cautious in most cases. The heavy flight is strong, steady, and rapid, bearing a certain resemblance to that of the Duck-tribe, while the birds experience considerable difficulty in starting, and laboriously flap their wings until fairly launched in the air, when they rise to some height, or skim the waves, as fancy dictates. They swim and dive to perfection, remaining a long time submerged, and indulging in many a turn and twist as they pursue their slippery prey, both wings and feet lending their aid to the performance. Ordinarily a spring precedes the plunge from the surface, but in presence of danger they disappear more quietly. Though the gait on land is an awkward waddle, Cormorants perch with ease on rocks, posts, and limbs of trees, where their upright posture gives them the appearance of black bottles or objects hung out to dry; they are stated, moreover, to be able to cling to the face of a cliff, and certainly can climb among thick vegetation, as in the case of *P. pygmaeus*. Not unfrequently they roost in trees, with the head drawn back upon the shoulders. The food, normally of fish, is varied by crustaceans, or even frogs and newts; the young are fed by regurgitation, and, when old enough, thrust their heads into their parents' bills to help themselves.[1] The note, comparatively seldom heard, is a harsh guttural croak, while the female hisses during incubation, in which she is said to be assisted by the male. The nest, placed

[1] P. L. Sclater, *P.Z.S.* 1882, p. 458.

in caves, on ledges of cliffs, tops of stacks, or low islands, and less commonly on trees, bushes or reeds, is a mass of sticks, grass, seaweed, rushes and the like, according to situation; the smaller species constructing a slighter platform when the trees are chosen, and a lining of green leaves being occasionally added. Early in spring colonies, often of very large dimensions, are formed by many —but not all—of the species for breeding purposes, the stench from the remains of decaying fish at such spots being decidedly unpleasant. Incubation lasts about four weeks. Cormorants were of old used in England for catching fish, and this has been a regular business from time immemorial in China and Japan; but with us it is a mere sport, the chief exponent of which is now Captain F. H. Salvin, whose chapters on "Fishing with Cormorants" will be read with pleasure by those interested in the subject.[1] The bird rises to the surface to swallow its prey, but a strap round the neck allows it to dispose of the smallest only of its captures, while it is forced by its master to disgorge the remainder before it is rewarded with a portion of the catch.

Plotus anhinga, the Snake-bird or Darter of tropical and sub-tropical America, ranging northwards to West Mexico and South Carolina, is glossy greenish-black with beautiful silvery-grey markings on the scapulars and wing-coverts, a broad brown tip to the tail, which becomes white terminally, and long whitish hair-like feathers on the sides of the occiput and neck, merging into a black mane on the nape. The filoplumes are absent in winter, and are inconspicuous in the female, which differs, moreover, in having a grey-buff head, neck, and breast, the latter being divided from the belly by a chestnut band. The young resemble the mother-bird, but are duller and lack the chestnut tint. The peculiar long thin neck and corrugated rectrices have been mentioned above; the plumage is unusually close, and is chiefly composed of small soft feathers of very uniform distribution; the lores, orbits, chin, and throat are naked, the two former being apparently greenish, and the latter, which is moderately dilatable, orange. The bill is olive above and yellow below, the feet mainly olive with yellow webs. Three other species are recognised, but the variability in the amount of rufous in all makes their validity somewhat questionable. They are *P. novae hollandiae* of Australia, New Zealand, and New Guinea, with a

[1] Freeman and Salvin, *Falconry, its claims*, etc., London, 1859, pp. 327-349.

white stripe on the sides of the head and a white border to the gular sac; the almost identical *P. melanogaster* of the Indian Region, extending to Celebes; and *P. levaillanti* of the Ethiopian Region—described also from Antioch as *P. chantrii*—which has a rufous crown, buff throat, and chestnut greater wing-coverts.

Darters cannot be classed as marine birds, though they

FIG. 23.—Indian Darter. *Plotus melanogaster.* $\times\frac{1}{5}$. (From *Nature.*)

frequent inlets of the sea as well as lakes and rivers, where they sun themselves with outspread wings on some stump, rock, tree, or even tuft of rushes, while seldom admitting of a near approach. When disturbed, they circle in the air with the neck drawn back upon the shoulders, as do the Pelicans; but the flight is laboured, and they are much more at their ease in water, where they swim very low, exposing only the head and neck, or merely the bill, if danger threatens, and having a very snake-like appearance, as they

sway gracefully from side to side in their endeavours to keep the intruder in view. Hardly a ripple follows the prolonged dive, while below the surface the wings are but slightly used, the tail being often expanded, and the feet acting as powerful paddles. On reappearance a fish is generally to be seen grasped in the bill or transfixed by it, the peculiar mechanism of the vertebrae of the neck allowing the head to be darted forward at a moment's notice for the capture;[1] subsequently the prey is jerked up into the air, cleverly caught and swallowed. The food, which seldom varies, is sometimes obtained by the bird standing with the body immersed to waylay the passing shoals; but if Gould is correct in adding frogs, newts, and aquatic insects to the diet, these must be procured very differently. The nest, generally situated over water, is a flat or concave fabric of sticks, lined as a rule with leaves, moss, or roots, and often used for several years in succession. High trees or bushes are indifferently chosen, and colonies are usually, but not invariably, formed, several pairs being accustomed to breed in proximity on the branches. The two to five eggs are greenish-blue with chalky incrustation, like those of Cormorants, though smaller and more delicate. The note is short and hoarse. Both sexes are said to incubate, and to regurgitate food for the young.[2] Jerdon says that the scapulars of the Indian Darter were royal badges among the Khasias. It is tamed by boatmen in Bengal.

Fam. IV. **Fregatidae**.—*Fregata aquila*, the Frigate- or Man-of-War-Bird, the latter of which names is sometimes transferred to the Albatroses and smaller Skuas, is met with throughout the tropical regions, breeds in Laysan and has strayed to Nova Scotia. It is blackish-brown with green and purple reflexions; the bill is bluish, the feet are black, the orbits, lores, and pouch—inflated in flight—scarlet. The female is browner above and white below, with pinkish feet and no perceptible pouch; while the young resemble her, but shew some white on the head and neck. *F. minor*, found from Madagascar to Papuasia and North Australia, but seldom beyond these limits, is smaller, with less purple gloss and a white mark on each flank.

These birds are usually seen singly or in pairs, and are pre-eminently oceanic, seldom coming to land except near the breeding quarters, where they roost on the trees; the normal flight

[1] W. A. Forbes, *P.Z.S.* 1882, p. 210.

[2] These birds eject the lining of the gizzard in a most curious manner; cf. A. D. Bartlett, *P.Z.S.* 1881, pp. 247, 248.

is extremely rapid, graceful, and long-sustained, with sudden deviations from the course, but they often soar until they appear mere specks in the sky, descending thence with great abruptness. At times they float aloft with little apparent movement of the wide-spread wings, alternately opening and shutting the forked tail and inclining the head from side to side, while in hurricanes they fly low before the gale. At rare intervals they are found sitting asleep upon the shore. Flocks frequently pursue the surface-swimming fish, constituting their main aliment, which are seized

Fig. 24.—Frigate Bird. *Fregata aquila.* $\times \frac{1}{8}$.

almost without ruffling the water; squids, small crabs, flying fish, and young turtles being also eaten. To see a Frigate-bird plunge, however, is no uncommon occurrence, and the habit of forcing Terns, Boobies, and the like to disgorge their prey, which is caught before it reaches the waves, must not be forgotten.[1] If secured in an awkward position the captures are tossed up in the air, caught again and swallowed. The note, a harsh croak or cackle, is seldom heard. The nest of small sticks, which the birds tear off upon the wing, is generally in trees or bushes, though occasionally on the ground or on a bare rock; it is often

[1] H. O. Forbes, *Naturalist's Wanderings*, London, 1885, p. 32.

very slight, and almost invariably contains one egg, resembling that of the Cormorant. The young are fed by regurgitation, and both sexes are said to incubate, sitting very closely, and merely snapping at an intruder. The feathers are used for head-dresses in the Pacific Islands.

Fam. V. **Pelecanidae**.—*Pelecanus onocrotalus*, the Pelican, of South-East Europe, North-East and South-West Africa, reported also from France, Germany, and Denmark, is white with a rosy or salmon tinge, the primaries being black, and the moderate occipital crest and stiff elongated feathers of the lower fore-neck washed with yellow. The lores and orbits are naked, while an enormous dilatable semi-transparent pouch fills the space between the branches of the lower jaw. According to Mr. Dresser,[1] these parts and a fleshy knob appearing on the forehead in spring are yellow, the bill is bluish-grey with pink sides marked with red, and the feet are also pink. These colours, however, may vary with the season. In this species, and to a certain extent in *P. erythrorhynchus*, the feathering on the forehead ends in a point, but elsewhere is more or less concave anteriorly. Closely allied forms of doubtful validity are *P. minor*, with a somewhat similar range, *P. sharpii* of West Africa, and *P. mitratus* of South Africa. *P. crispus*, occupying a slightly more eastern area than *P. onocrotalus*, is distinguished from it by the curled filamentous plumes which overhang the sides of the head, the lack of rosy tints, and the flesh-coloured orbits. *P. erythrorhynchus* of temperate North America, found in winter down to Guatemala, resembles the last-named, but has a still more pendent nuptial crest, and in the breeding season develops a curious triangular horny excrescence on the middle of the culmen, shed about May. The chest and wing-coverts shew a little yellow, the bill and naked parts are reddish, the feet orange-red, while the lower jaw is densely feathered. *P. rufescens* of the Ethiopian Region, apparently identical with *P. philippensis* of South Asia, is white, with black primaries, and a grey shade on the secondaries, tail, crested head, or even lower surface; the back is rose-coloured; the stiff feathers on the fore-neck, the bill and pouch, are yellowish, with vertical red lines on the latter. The remainder of the bare skin is flesh-coloured, and the feet are pink. *P. fuscus* of the warmer coasts of North America, the range of which south of Panama is uncertain, and depends upon the

[1] *Birds of Europe*, vi. 1879, pp. 193, 194.

validity of *P. molinae* of Peru and Chili, has a white or occasionally yellowish head, silvery-grey upper parts with dusky streaks, and browner under parts. The crested nape is chestnut, varying to blackish; the bill and loral region are grey or bluish, the dark-tipped maxilla being spotted with red; the pouch is red, or dusky, like the feet; the bare orbits are blue. *P. conspicillatus* of Australia and Southern New Guinea is white, with black wings and tail and

FIG. 25.—Crested Pelican. *Pelecanus crispus.* $\times \frac{1}{9}$.

a yellow wash on the chest; the bill, feet, and naked parts are yellowish-white, with a blue tinge on the two first and a similarly coloured ring round the orbits, which are divided by a feathered space from the lores. In this Family the sexes are alike; the young being usually crestless, and of a brown hue, with yellowish or dusky pouch and occasionally white mottlings.

Pelicans inhabit not only tidal waters, but also swampy districts and inland lakes, traversing in some cases vast distances on migration, and being usually found in company. Though

heavy, and of enormous size, they fly buoyantly and swiftly, with the neck drawn in upon the shoulders and the feet extended behind; while at times they soar in spiral fashion to great altitudes, and circle around with alternate flapping and sailing movements. On land the gait is awkward and waddling, and great difficulty is experienced in rising; but some species habitually perch, and all are very proficient in the water, swimming, diving, or plunging from great heights, according to their various customs. The food consists almost entirely of moderate-sized fish taken by the bird either by pouncing down sharply from above, or, when quiescent on the surface, by immersing the head or disappearing totally from sight with a somersault. The prey is chiefly sought in shallows, and is retained in the pouch until the birds return to land, or until it is transferred half-macerated to the young; occasionally the adults may be seen gorged after feeding, sitting upon the water or basking in the rays of the sun. The deep loud note is very seldom heard. Pelicans usually breed in colonies in wild districts, though occasionally near villages,[1] the nest, when on the branches of trees, being of sticks with a lining of twigs or roots, as in *P. philippensis*; at other times it is a rough mound of gravel and rubbish on the ground with a slight cavity above, as is often the case in the American species, which also lay in mere depressions in the sand, the localities chosen being generally islands in lakes or rivers; the European forms amass a pile of reeds and grasses among aquatic herbage in like places or swamps, while the Australian constructs a large fabric of sticks and water-plants in similar spots or on the summits of rocky islets. The eggs, varying from one to five, but ordinarily two or three in number, are white or bluish-white with a chalky incrustation, soon becoming soiled and often stained with blood. The parents are as a rule shy and easily scared from the nest, where the smell from the refuse fish and excrement is in many cases intolerable. Incubation lasts about four weeks. Bands of these birds sometimes unite to systematically beat the water for their prey, stowing it in the distensible pouch. In India they are used—frequently with the eyes sewn up—to decoy fish by their oily secretions,[2] and in various countries they are slaughtered for the sake of the latter. The fable of the young being fed with blood from the

[1] Jerdon, *Birds of India*, ii. Calcutta, 1877, p. 860. [2] *Ibid.*

female's breast may have arisen from confusion of the Pelican with the Flamingo, which ejects a blood-like liquid from its mouth.[1]

Of fossil Steganopodes we have *Phaëthon* from the Pliocene of India; three species of *Pelecanus* from the same formation of the Siwalik hills, one from the Miocene of Bavaria, one from that of Allier in France, and one from the Queensland drifts; while in England that genus is recorded, on the strength of the humerus, radius, and ulna from the Plistocene of Norfolk and from the Isle of Ely. *Sula* has occurred in the Miocene of Carolina, and of Auvergne and Ronzon in France; the giant *Pelagornis*—akin to *Sula* and *Pelecanus*, but perhaps indicating a distinct family—has also been found in the Miocene near Bordeaux; and *Argillornis*, related to *Sula*, in the Lower Eocene (London Clay) of England. From the same beds we have the remarkable *Odontopteryx toliapica*, with coarsely serrated edges to the jaws; *Phalacrocorax* has been met with in the North American Pliocene, the same strata of the Siwalik hills, the Miocene of Allier and the Orléannais in France, and the Pampean of Argentina, *Actiornis anglicus* of Lydekker being a close ally from the Hampshire Eocene; *Plotus nanus* has been described from the Mare aux Songes in Mauritius and from Central Madagascar, *P. parvus* from Queensland.

The Sub-Order ARDEAE contains the Families *Ardeidae* and *Scopidae*, in which the body is often compressed, the head and eyes are large, and the neck is long. Most members of the former have a long, straight, sharp bill with rounded culmen and flattened sides, the edges being commonly serrated and the maxilla notched; it may be comparatively small, as in *Zebrilus*, but is usually stout, and in *Cancroma* is extraordinarily broad and depressed, with prominent keel and somewhat dilatable skin beneath, the form resembling that of an inverted boat. *Balaeniceps* (Fig. 27) has a huge beak, which is not only flattened and swollen, but has a ridge on the culmen terminating in a hook, the maxilla having an undulating outline above and following the strong upward curve of the mandible below, while its sides are grooved. So peculiar, indeed, is this bird that it might well stand alone in a Sub-family *Balaenicipitinae*, as opposed to the *Ardeinae*, if not referred to the Storks, where many writers have placed it. In *Scopus* the bill is acute, keeled, greatly compressed, and laterally grooved, with a small hook at the tip. The tibia is usually bare

[1] A. D. Bartlett, *P.Z.S.* 1869, p. 146.

below, though occasionally feathered, as in *Ardetta* and *Zebrilus*; the metatarsus being remarkably long, except in such forms as *Nycticorax*, *Botaurus*, and *Ardetta*. The latter member is covered anteriorly with transverse or hexagonal scales, which become smaller or reticulated behind, and show a decided tendency to fusion in many cases. The toes are long, with a distinct web between the middle and outer: the claws are generally short and curved, though elongated, slender, and nearly straight in *Botaurus* and *Ardetta*; that of the middle digit being toothed on the inner side, save in *Balaeniceps*. The wing is somewhat rounded, yet long, and has eleven primaries—reduced to ten in *Scopus*—and from eleven to eighteen secondaries; the fairly even tail is short or moderate, with from ten to twelve broad stiffish feathers, except in *Botaurus* and *Ardetta*, where the ten rectrices are soft and abbreviated. The tongue is usually long and pointed, but in *Cancroma*, *Balaeniceps*, and *Scopus* it is very short; the lores and orbits are naked, save in *Scopus*, as is the malar region in *Tigrornis* and *Tigrisoma*, while the last at times has the throat bare, or merely feathered centrally. The nostrils are impervious only in *Cancroma* and *Balaeniceps*. The nestlings are uniformly covered with sparse hair-like down. The state of the chick is unrecorded in *Balaeniceps* and *Scopus*. The furcula is generally V-shaped, the syrinx is tracheo-bronchial, and an aftershaft is present, the latter and the syringeal muscles being much reduced in *Balaeniceps*. Crests and decorative plumes are common, as will be seen below.

Of especial importance are the large, thick, "powder-down patches," or greasy yellow spaces covered with tufts of grey or black filaments, disintegrating into bluish or whitish powder. *Balaeniceps* has a big pair on the lower back, *Botaurus* and *Ardetta* an additional couple on the breast, and the remainder of the Ardeidae two more on the abdomen, except *Cancroma* which possesses still another pair on the upper back. In *Scopus* they are absent. The use is uncertain, and the occurrence quite irregular.

Fam. VI. **Ardeidae**.—There are few persons in Britain who are not to some extent acquainted with the habits of the Common Heron or Hern, for it may be seen on the coast as well as on inland waters, and now breeds in more localities than formerly, though in smaller numbers: while of the remainder of the Family the Bitterns alone differ conspicuously in their mode of life. Herons are shy, solitary birds, frequenting lakes, fens, and rivers, where they

may often be seen standing ankle-deep in the water, and watching with untiring patience for the prey which never seems to satisfy their appetite. They rarely swim and walk but little. The majority breed in large colonies; but Bitterns (*Botaurus*), Little Bitterns (*Ardetta*), and Green Herons (*Butorides*) are notable exceptions, being, moreover, skulking and nocturnal in habit, and agreeing in the latter respect with Night-Herons (*Nycticorax*). The mud-flats commonly found on sandy shores provide excellent feeding ground, and thence old and young may be seen winging their way at considerable altitudes with leisurely flapping flight—rarely accelerated—to roost at night on the customary trees or rocks. Bitterns and their nearest allies are seldom seen far from marshes, flying noiselessly with laboured action and at a comparatively slow pace; they are, however, adepts at running or climbing among the water-plants, and perch with ease; while they often assume an upright position with the bill vertical, and thereby closely resemble the surrounding reeds, the deception being occasionally enhanced by the bird turning as if on a pivot and facing the spectator constantly.[1] Herons fly with the head drawn back, therein differing from the rest of the Order, and in some cases roost or bask in the sun on one leg; they are usually graceful and stately, the beautiful Egrets moving more easily on land than their kindred, and being somewhat less wary. The voice is a harsh croak or guttural sound, that of the Night-Heron verging upon a quack: while the Bitterns, besides the common cry, utter a booming or bellowing note in the breeding season, generally heard at night or early in the morning, the method of production of which is not at present quite clear. *Ardetta* gives vent to a somewhat similar but weaker boom or grunt, and most species are noisy at the nest, hissing or screaming sharply. The diet consists largely of fish, but is varied by small mammals, birds, reptiles, amphibians, grasshoppers and other insects, molluscs, crustaceans, and worms, the digestion being very rapid and the birds seldom gorged. In the shallows the majority of the family stand motionless, and spear their prey with the beak as it passes, occasionally mauling it before swallowing; but some move from place to place, while the Buff-backed Heron (*Ardea bubulcus*) habitually picks insects from the backs or sides of the cattle. The nest, commonly situ-

[1] Sclater and Hudson, *Argentine Ornithology*, ii. 1889, pp. 103, 104.

ated on lofty trees, though frequently on low bushes, ivy-covered cliffs, flat rocks, or reeds and herbage in swamps, is often a large fabric of sticks without lining or with a slight bedding of grass, leaves, and the like, but may be a mere mass of rushes and flags; the tree-building forms at times resorting to the ground and *vice versâ*. Bitterns generally crush down the aquatic vegetation and add softer materials on this substructure, depositing four or five olive-drab eggs; *Ardetta* in some cases does the same, but the eggs are bluish- or greenish-white; whereas those of the Herons proper are of a greenish- or whitish-blue colour of varying depth, and exceptionally amount to six or seven. *Butorides* not uncommonly lays only two. If the first set is removed a second is often produced after a short interval; but the young remain long in the nest. Incubation lasts from sixteen to thirty days. Herons were of old protected by law, as affording an excellent quarry for Falcons, while the flesh was highly esteemed: when wounded, however, they must be carefully approached, as they use the bill with deadly effect, and aim at the captor's eye. In India they are used as decoy-birds with the eyes sewn up.

The following will sufficiently shew the coloration: the largest species is *Ardea goliath*; *Ardetta* furnishes the smallest forms.

Botaurus stellaris, the Bittern, which bred so lately as 1868 in Norfolk, and occurs throughout the warmer parts of the Palaearctic and the whole of the Ethiopian Region, is buff, with black bars above and streaks below, black crown, nape, and stripes down the side of the neck, and chestnut bands on the primaries. *B. lentiginosus*, distinguished by the nearly uniform brown primaries, is rarely found in Britain, but inhabits North America, probably meeting about Nicaragua with *B. pinnatus* of tropical South America, which lacks the neck-stripes; while *B. poeciloptilus* of the Australian Region has much of the back brown. The neck-feathers in these birds form an elongated ruff. *Ardetta minuta* of Central and Southern Europe, Western Asia, and the northern half of Africa, formerly known to have bred in England, is greenish-black, with buff neck, wing-coverts, and under surface, the latter slightly streaked with dusky. These streaks are more decided in other species, which are often greyer, browner, or more ruddy above; *A. cinnamomea* of the Indian Region is almost entirely rufous, while all have a slight head-tuft. A fuller crest marks *Zebrilus pumilus* of northern South America, wherein

the upper parts are black with fulvous undulations, and the lower parts correspondingly mottled. The "Tiger-Bitterns" (*Tigrisoma*) extend from Central America to North Argentina, the four or five forms varying chiefly in the amount of naked skin on the throat. *T. brasiliense* is blackish with rusty vermiculations above, and reddish-grey below, the head being mainly chestnut, and the tips of the remiges and spots on the breast white. *Tigrornis leucolophus* of West Africa has a narrow white crest, the neck-feathers hanging loosely down, as in *Tigrisoma*. *Zonerodius heliosylus* of New Guinea is black above with fulvous bands, and has white bars on the wing; the rump and fore-neck are white with dusky markings, the lower parts yellowish-white. The genus *Butorides*, connecting the Bitterns and the Herons, exhibits somewhat elongated plumes on the crown, fore-neck, and scapular region. These small birds, variegated with glossy green, black, grey, and chestnut, and often streaked with white, occur chiefly in the Neotropical and Australian Regions, though *B. virescens* at least inhabits North America and *B. atricapilla* the Ethiopian countries.

Nycticorax (Night-Heron) is an almost cosmopolitan genus, remarkable for the long linear blackish or white occipital feathers, from two to ten in number, apparently lost for a time after breeding. In our occasional visitor, *N. griseus*, of the Palaearctic, Indian, and Ethiopian Regions, and the barely separable *N. naevius* of America, the colour is greenish-black, with grey neck, rump, wings, and tail, white cheeks and lower parts. *N. leuconotus* of the Ethiopian Region has the neck rufous, the back white, and the under surface spotted with dusky; *N.* (*Pilerodius*) *pileatus* of tropical South America is white with black crown; *N.* (*Nycterodius*) *violaceus* of the same districts, which extends to the United States, is plumbeous, with yellowish-white crown and black stripes above, the scapulars being somewhat decomposed; *N. pauper*, confined to the Galapagos, is very similar; *N.* (*Syrigma*) *sibilatrix* of South Brazil, Chili, and Argentina, is grey, with blackish head and remiges, rufous markings on the face and wing-coverts, and yellowish-white breast; *N.* (*Gorsachius*) *goisagi*, ranging from India and the Malay countries to Japan, is red-brown, with buff and white lower parts, the whole plumage being marked with dusky; while *N. caledonicus* of the Australian Region has the upper parts rich buff, the lower parts white, and only the head black. *Cancroma cochlearia*, the Boat-billed Night-Heron of South

America, is blue-grey with white on the forehead and neck: the head, crest, and flanks being black, and the belly cinnamon. *C. zeledoni* of Central America differs in its reddish fore-neck.

Ardea, another world-wide genus, may be subdivided as below if desired,[1] but the supposed generic characters are hardly satisfactory. *A.* (*Buphus*) *bubulcus*, the Buff-backed Heron of South Europe, Africa, and Asia to the Caspian, is white, with buff crown and nape, and elongated occipital, scapular, and jugular plumes of the same colour, developed in the breeding season; *A. coromanda*, with orange head, neck, and scapulars, replacing it from the Caspian eastward and reaching Japan. The former has once visited Britain, while *A.* (*Ardeola*) *ralloïdes*, the Squacco Heron, has done so frequently. This bird, which ranges from the Canaries and Central Europe to South Africa and Persia, is warm buff, with white wings, tail, breast, and belly, the darker back possessing long hair-like plumes which cover the tail, the jugulars being buff, and the head graced by a tuft of long white feathers, margined with black. *A.* (*Lepterodius*) *gularis* of tropical Africa and Madagascar, and *A. asha*, extending from the Persian Gulf to India, are dusky-slate with white throat, and have moderate scapular and pectoral plumes, with a nuptial crest. *A.* (*Demiegretta*) *sacra*, ranging from Bengal to Japan, Australia, and the Pacific, differs in having only a white streak down the throat, *A. greyi* being a white phase. *A.* (*Melanophoyx*) *ardesiaca* of the Ethiopian Region is almost entirely slaty-black, with elongated occipital, dorsal, and jugular feathers; *A.* (*Notophoyx*) *picata* of Australia, New Guinea, and the Moluccas, is bluer, and nearly white below; while *A. pacifica* of that country is greener, with white head and rufescent dorsal plumes. *A.* (*Dichromanassa*) *rufa* of the warmer parts of North America is plumbeous, with reddish head and neck, its white phase being denominated *A. pealii;* here nearly all the head- and neck-feathers are elongated, and the filamentous scapulars extend beyond the tail. *A.* (*Hydranassa*) *tricolor*, found from the Southern United States to Brazil, is grey-blue, purple, rufous, and white, with shorter seasonal plumes than the preceding: *A.* (*Florida*) *caerulea*, with a slightly more northern range, is slaty-blue, with maroon head and neck, a variable amount of white when immature, and extremely long scapulars: while *A.* (*Agamia*) *agami* of central and northern

[1] Cf. Sharpe, *Cat. Birds Brit. Mus.* xvii. 1898-9, pp. 56-59.

South America is metallic green, with rufous and white throat, rufous belly, black cheeks and nape; the very long occipital and dorsal plumes being grey, as is the fore-neck, and the recurved feathers of the sides of the neck reddish. *A.* (*Garzetta*) *garzetta*, the "Little Egret," which has strayed to Britain, and extends from South Europe to the whole of Africa, India, and Japan, is entirely white, with long filamentous scapular and moderate jugular plumes and two lengthened crest-feathers, all of which are said to be temporarily lost after breeding. *A. nigripes*, ranging from Java to Australia, is barely distinguishable, but the American representative, *A. candidissima*, has a large occipital tuft. *A.* (*Herodias*) *alba*, the "Great White Heron," another of our rare visitors, extends from the middle of Europe to most of Africa, Central Asia, and the Burmese countries, beyond which a doubtfully distinct species, with yellower bill, reaches Australia and New Zealand; the American *A. egretta*, however, differs in its black legs. The breeding adult is white, with very long decomposed scapular and lengthened jugular plumes, but no crest. The most typical forms of *Ardea* are large slaty-coloured birds, varied by black, rufous, and white, the head being commonly darker and the lower parts striped; while two slender occipital plumes are,

FIG. 26.—Common Heron. *Ardea cinerea*. × $\frac{1}{7}$.

in most cases, developed in the nuptial period, and the scapular and jugular feathers are elongated, though not decomposed. The Common Heron (*A. cinerea*), ranging through Europe, Africa, and Asia, to Japan and Australia, needs no description, but the Purple Heron, *A.* (*Phoyæ*) *purpurea*, though it often occurs in Britain, is less well known. It is grey, with black crown and black stripes down the sides of the buff neck, chestnut scapulars, rufous, grey, and black jugular plumes, and maroon breast; the range being from Central and Southern Europe to South Africa, China, and the Philippines. *A. herodias* of North America meets in northern South America the white-necked *A. cocoi*, both species resembling *A. cinerea*, but the former having rufous thighs and edge of the wing. The white *A. occidentalis*, of Florida and Cuba,[1] was formerly thought to be an instance of dichromatism. The African *A. goliath* has the head and neck rufous and the under surface chiefly maroon.

Fig. 27.—Whale-head or Shoe-bill. *Balaeniceps rex.* $\times \frac{1}{14}$.

The sexes are usually alike; but the female has ordinarily shorter plumes, and may be duller, as may the young, though the stages of plumage are not yet completely worked out. White or rufous markings are often noticeable, especially in immature specimens of *Ardea;* there is little red about the head in those of *Dichromanassa*, though in *Hydranassa* the amount is greater than in the adult; those of *Florida* are generally very white; and, conversely, white

[1] Ridgway, *Manual N. Amer. Birds*, 1887, p. 128. *A. würdemanni* of Florida is a close ally.

species often shew grey tints in early life; while immature examples of *Nycticorax* differ entirely from their parents, being brown with white or buff spotting above, and white with dusky stripes below.

The bill, feet, naked lores, and orbits may be reddish, bluish, green, yellow, brown, or black.

Balaeniceps rex, the Shoe-bill, of the White Nile, has a short crest, and is brownish-grey with blackish wings, tail, and feet, the bill being yellow with dusky mottlings. It usually forms large flocks, and frequents bushy morasses. The flight is Heron-like, and the birds will often settle on trees; the young run about with extended wings and clattering bills.[1] The food consists of fish, frogs, snakes, molluscs, and even carrion. A mere hole in the dry soil often contains the chalky white eggs, from two to twelve in number, but a lining of herbage is frequently added.

FIG. 28.—Hammer-head. *Scopus umbretta*. × $\frac{1}{6}$. (From *Nature*.)

[1] Petherick, *P.Z.S.* 1860, pp. 195-198, and *Ibis*, 1859, p. 471.

Fam. VII. **Scopidae.**—*Scopus umbretta*, the Hammer-head, of Madagascar and a large part of the Ethiopian Region, is purplish-brown, with black tail-bars, wider towards the tip; the head exhibits a thick erectile crest, generally carried horizontally; the bill is black and the feet are brownish. It frequents wooded districts near water, and is usually found in pairs; not being very shy, except when breeding, and being more active at dusk than in the daytime. At night it roosts in trees. The neck is slightly curved in flight, but the feet are outstretched, while the gait on the ground is deliberate. The note is a harsh quack or weak metallic sound; the food consists of fish, reptiles, frogs, worms, molluscs, and insects captured in shallow water, and while feeding the birds have a curious habit of skipping round each other with extended wings. The nest is an enormous structure of sticks, lined with roots, grass, rushes, or clay, having a hole at the side, and ordinarily a flat top: it is placed in a tree, on a rocky ledge, or exceptionally on the ground. Three to five white eggs form the complement. Native imagination associates this species with witchcraft.

Besides the extinct brevipennate *Nycticorax megacephalus* of Rodriguez, known to the first colonists, and the fossil *Butorides mauritianus* of the Mare aux Songes, this Sub-Order furnishes *Proherodius oweni* from the London Clay (Lower Eocene); *Ardea* from the Miocene of France and Germany, and the Pliocene of Oregon.

Fam. VIII. **Ciconiidae.**—Of the Sub-Order CICONIAE, the first Family is that of the Storks, which have long necks and also long stout beaks, usually straight and fairly cylindrical, but occasionally compressed, as in *Leptoptilus*, upturned towards the tip, as in *Mycteria*, or decurved, as in *Tantalus*; in *Anastomus* there is a wide gap between the grooved mandibles, the edges of the maxilla possessing fine horny lamellae. Very remarkable, moreover, are the unprotected pervious nostrils, which are mere perforations in the bony sheath. The tibia is partly bare, while the elongated metatarsus is covered with hexagonal scales, becoming more reticulated behind in *Leptoptilus* and *Mycteria*; the partially webbed front toes and flattened claws are in most cases very short—though lengthened and more slender in *Tantalus*—and rest upon horny pads,[1] the hallux being slightly elevated. The wings are ample and fairly long, with eleven stout primaries in *Ciconia* and twelve elsewhere, and from fourteen to twenty-five secondaries, the inner of which are often greatly

[1] Ridgway, *Bull. U. S. Geol. Surv.* iv. Art. ix. 1878, pp. 249-251.

developed. The short tail is normally even or slightly rounded, with twelve broad feathers, but in *Dissura* it is deeply forked [1] and rigid, while the unusually stiff coverts extending from beneath are easily mistaken for rectrices. In *Leptoptilus* these elongated coverts are soft, and are the genuine "Marabou feathers." The furcula is U-shaped, the tongue rudimentary, the aftershaft present or absent, and there are no powder-down patches; the trachea in the male of *Tantalus ibis* has several intrathoracic convolutions,[2] while there is an entire want of syringeal muscles. The adults and young possess uniform down, that of the nestlings being greyish or whitish.

Storks, though easily tamed, are naturally shy, solitary birds, which frequent wooded or open country on plains or hills, usually near inland waters, creeks, or salt-water lagoons; the White Stork and the Adjutant are, however, instances of somewhat different habits, the former showing a predilection for homesteads, and the latter being protected as a scavenger in some parts of India; while *Ciconia abdimii* is considered a "bird of blessing" by the natives of Africa. Flocks are occasionally seen. The flight is graceful and noiseless, but powerful and rapid, the neck and legs being carried in line with the body, and immense heights being often attained by soaring and circling movements. No difficulty is experienced in walking, and many species stalk solemnly about in pursuit of prey, whether in water or on dry land; not uncommonly they rest with the whole metatarsus upon the ground, or stand on one foot with the bill touching the breast. They are ordinarily quiescent during the heat of the day, and at night frequently roost in trees. *Mycteria senegalensis* and *M. indica* are said to dance around their mates, the former skipping and bowing, and the latter fluttering its extended wings, which touch those of its partner, while advancing the head and making a clatter with the bill.[3] Generally speaking, this is the only noise Storks produce, owing to the want of voice-muscles; but Adjutants are said to utter a loud grunting croak or bellow, and the young of *Ciconia nigra* to give vent to a guttural cry. The food consists of fish, reptiles, amphibians, crustaceans, molluscs, grasshoppers, and beetles, with small mammals, or even eggs and young of birds; but *Leptoptilus* is nearly omnivorous and enjoys carrion, including human carcases,

[1] Ridgway, *Bull. U.S. Geol. Surv.* iv. Art. ix. 1878, pp. 249-251.

[2] Garrod, *P. Z. S.* 1857, p. 297.

[3] Layard, ed. Sharpe, *Birds of South Africa*, 1875-84, p. 732, and Hume, ed. Oates, *Nests and Eggs of Indian Birds*, iii. 1890, p. 266.

Dissura maguari having like habits. *Anastomus* is called the "Shell-Ibis" from its cleverness in extracting *Unio* and other molluscs from their shells, and *Mycteria* thrusts its bill into the ground in search of grubs. The nests are frequently in tall trees, but may be on ledges or in cavities of cliffs, or on flat tops of rocky hills; the shallow fabric, often of enormous size, being composed of sticks with or without a lining of grass, leaves, moss, rushes, feathers, down, or, exceptionally, clay. Colonies are in most cases formed, but White Storks occupy separate sites on houses, farms, towers, or even cart-wheels purposely erected, and Black Storks breed apart in woods and precipitous gorges. On the other hand, more than thirty nests of *Anastomus* have been observed in one tree. The eggs, numbering from three to six, are white and chalky, and are stained easily. Incubation lasts nearly four weeks. The adult inserts its bill into that of the helpless nestling to feed it, while the male attends constantly upon his sitting mate; we may, however, safely disregard the more fabulous instances of affection recorded.

"Wood-Ibises" are similar in habits, but they are more gregarious; and build smaller nests of twigs lined with moss, laying as many as eight white eggs, rarely streaked with pale brown.

Tantalus loculator, the "Wood-Ibis" of the warmer parts of America, is white, with metallic greenish-black remiges and rectrices, the bare head and upper neck being covered with dusky corrugated skin, and the crown with a smooth plate. The beak and feet are lead-coloured, the under wing-coverts pinkish. *T.* (*Pseudotantalus*) *ibis* of the Ethiopian Region has only the front of the head naked, but is rosy towards the upper and under wing-coverts, the smooth face and feet being red and the bill yellow. *T. leucocephalus* of the Indian and Indo-Chinese countries differs in its yellow face, while the Indo-Malay *T. cinereus* has it red and black.

Anastomus oscitans, the "Open-bill," another Indian and Indo-Chinese species, is white, with black scapulars, remiges, and rectrices, yellow bill and feet; the Ethiopian *A. lamelligerus* is metallic black varied by a little rufous, the shafts of the feathers of the fore-neck and lower parts in adults expanding into flat shining, horn-like plates at the tip. *Leptoptilus dubius*, the "Adjutant" of the Indian Region, is greenish-black above and white below, the fleshy-red head and neck being naked with a few hairs, and a white ruff surmounting the shoulders, while a huge ruddy pouch, communicating with the nasal cavity, hangs below the throat. The

bill is greenish and the feet greyish, the former being yellowish and the latter black in the two following species. The Ethiopian *L. crumenifer* has the bare portions spotted with black ; *L. javanicus* of Manchuria and the Indian Region has some white on the wing-coverts, yellow naked parts with a horny greenish crown, a line of hair on the nape, and a tuft on the fore-neck.

Mycteria americana, the "Jabiru," ranging from Texas to Argentina, is white, with black head, neck, bill, and feet ; the

FIG. 29.—White Stork. *Ciconia alba*. × $\frac{1}{10}$.

naked head having a hairy patch on the occiput, and the bare neck a red distensible basal band. The Australian and Papuan *M.* (*Xenorhynchus*) *australis* is black with purple and green gloss, except the back and lower surface, which are white ; the head and neck are feathered, the bill is black, the feet are red. The Indian *M. indica* is barely separable. *M.* (*Ephippiorhynchus*) *senegalensis*, the Ethiopian "Saddle-billed Stork," differs in having a triangular frontal shield of yellow skin, a naked crimson pectoral spot, a crimson bill with black median band, and black metatarsi with reddish joints. *Dissura episcopus* of the Indian and Ethiopian

Regions is metallic black with white abdomen and under tail-coverts, downy white head and neck with black crown, reddish bill and feet. *D. maguari* of South America has the head and neck feathered, naked red lores and sides of the throat, white plumage with black wings and tail, yellowish bill and red feet.

Ciconia (*Abdimia*) *abdimii* of the Ethiopian Region is bronzy-black with white lower surface: the chin, membranous forehead, and tip of the bill being orange-red, the remainder of the bill greenish and the bare cheeks bluish. *C. nigra*, the Black Stork of British lists, is iridescent black, with white breast and belly, red bill, feet, and orbits; *C. alba*, the White Stork, a much more common visitor here, is white with black wings and orbits, red bill and feet. The former—reckoning for the irregular distribution characteristic of the Family—may be said to inhabit Europe, Palaearctic Asia, and North Africa, wintering southward to India and Cape Colony; the latter is more abundant within a like area, and is represented in East Siberia, China, and Japan by *C. boyciana* with black bill and red orbits.

The sexes in this group are similar; but when immature the whiter species are often more dusky, and the blacker species brownish, while the bill and legs may then be greenish instead of red, as in *C. nigra*, or the head and neck more feathered, as in *Tantalus*.

The Fossils referred to this Family are *Propelargus* of the Upper Eocene of France, *Pelargodes*, *Tantalus*, and possibly *Leptoptilus* of its Miocene; *Amphipelargus* of the Pliocene of Samos; *Palaeociconia* of the Plistocene of Brazil; *Palaeopelargus* and *Xenorhynchus* of that of Queensland.

Fam. IX. The **Ibididae,** connected with the Storks through *Tantalus*, may be divided into the Sub-families (1) *Ibidinae* or Ibises, and (2) *Plataleinae* or Spoonbills. In the former the long bill is weak, nearly cylindrical, and strongly curved; in the latter flattened, narrowed in the middle, and dilated into a terminal "spoon," which finally turns downwards. The nasal grooves are remarkably elongated, the skull is somewhat square in *Thaumatibis* and *Graptocephalus*. The tibia is partly bare, the metatarsus of medium length and often stout, with transverse or hexagonal scales becoming almost reticulated behind, or even in front in *Hagedashia* and *Carphibis;* the toes are generally long, with short anterior webs and variable claws, that of the third digit being sometimes serrated. The moderate wings have eleven primaries and from fourteen to

nineteen secondaries; the tail of twelve rectrices is usually short and even, or slightly rounded, but may be long, as in *Comatibis, Geronticus, Cercibis,* and *Theristicus;* in the last two of which it is cuneate. The furcula is U-shaped, the tongue rudimentary, the nostrils are pervious, an aftershaft is present, but there are no powder-down patches or syringeal muscles. *Platalea leucorodia* has the trachea convoluted like a figure of 8 in old birds. Adults and nestlings are uniformly downy, the latter varying from black with a white band over the crown in *Plegadis* to white in *Platalea.*

Sub-fam. 1. *Ibidinae.*—Ibises are shy birds, which inhabit not only marshy spots and wooded country, but also the driest of plains and rocky gorges, being found both in pairs and in flocks. The flight is tolerably high and rapid, with extended neck and legs, most species habitually sailing or circling aloft, though *Plegadis* rises with a whirr and skims along at no great elevation. On the ground the gait is graceful, and swimming is certainly practised at times, nor are perching or roosting on trees or reeds uncommon habits. The usual note is loud and harsh, *Ibis melanocephala* being said to have a booming call[1] and *Inocotis* a melancholy scream[2]; the food consists chiefly of aquatic insects, molluscs, crustaceans, and worms; but small fish, lizards, newts, frogs, grasshoppers, and beetles form part of the diet; *Geronticus,* which does not despise carrion, acts as a scavenger. Most Ibises wade in pursuit of prey, whether in fresh or salt water, moving the bill to and fro, and probing the subjacent mud. Some species breed apart, others in colonies; the nest being placed on trees or low bushes, and more rarely among reeds, or, as in *Geronticus* and *Comatibis,* in holes in cliffs or on ledges. The structure is not remarkably large, and is composed of sticks or stems of plants, with or without a lining of herbage, straw, or roots; the eggs, from two to four in number, being deep green-blue in *Plegadis,* pale blue in *Graptocephalus,* similar or darker in *Inocotis,* olive-green in *Hagedashia,* and greenish-white in *Ibis* and *Eudocimus,* or even brownish in the last-named. In all except the first two there are generally reddish or brownish markings. Incubation lasts about three weeks.

Eudocimus ruber and *E. albus,* the Scarlet and White Ibises of tropical America, are respectively coloured as the names import, the tips of the longer primaries and of the bill being black, while the

[1] Hume, ed. Oates, *Nests and Eggs of Indian Birds,* iii. 1890, p. 227.
[2] Jerdon, *Birds of India,* ii. Calcutta, 1877, p. 770.

bare front of the head and throat, the remainder of the bill and the feet are red. The former, of more eastern range, strays to the southern United States, the latter occurring farther north, and breeding in Florida. *Lampribis olivacea* of West Africa is coppery olive-green, with buff centres to the feathers of the loose occipital crest and under parts, the wings being more metallic, and the naked forehead and loral region black. The bill and feet are red. *Plegadis falcinellus*, the Glossy Ibis, which occasionally visits Britain, is found irregularly in Northern Europe and commonly in the south, extending through most of Asia and North Africa, and migrating as far as Australia and Natal. It also occurs in the South-Eastern United States and the West Indies. The head, neck, mantle, and lower surface are chestnut, the remaining parts purplish-green and bronzy, with bare greenish lores and blackish bill and feet; *P. guarauna*, which represents the genus from the Western and Southern United States and the Hawaiian Islands to Patagonia, having red lores, white feathers round the beak, and at times red bill and feet. *P. ridgwayi* of Peru and Chili is purplish-black below, with reddish-grey bill and black feet. *Cercibis oxycerca*, found from Colombia to Upper Amazonia, is dark olive-green with a little purple and blue gloss, the naked face and throat being pinkish and the bill and feet yellowish. The crest is slight, while a line of feathers ascends the throat. *Lophotibis cristata*, confined to Madagascar, is reddish-chestnut, with white wings, blue-green tail, and an enormous crest combining all three colours; the bill is greenish, the feet and the bare orbital region are red. *Phimosus infuscatus*, ranging from Colombia to Argentina, is bronzy-green with purple reflexions, the feet, bill, and face being pink, with papillae on the forehead and cheeks. The slightly crested *Harpiprion cayennensis*, occurring from Panama to South Brazil, is similarly coloured, but has greenish-grey bill, feet, and naked skin on the lores, chin, and sides of the throat. *Molybdophanes caerulescens* of Brazil and Argentina is greyish-green with dark bluish remiges, grey-brown crown, nuchal crest and lower parts, white frontal band, naked black chin and warty lores, black bill and yellow feet. *Theristicus caudatus* of Guiana is greenish-brown, with orange-buff head and neck, blackish under parts, and partially white wing-coverts; the papillose lores, upper throat, and orbits being naked and black, and a whitish tuft adorning the chin. The bill is black with greenish tip, and the feet are red.

T. melanopis, differing in its rufous breast, inhabits America from Peru and Brazil southwards; *T. branickii* being probably identical. *Bostrychia carunculata* of North-East Africa is greenish-brown with metallic reflexions and white on the wing-coverts, the crested head and under surface having whitish margins to the feathers, and the bill, feet, and a long thin gular caruncle being red. *Hagedashia hagedash*, of the Ethiopian Region generally, is somewhat similar but brighter, with no white on the wing and no crest or wattle; the dusky lores are bare and warty, the bill is black with crimson base to the culmen, and the feet are chiefly red. *Geronticus calvus* of South Africa, except for its shorter crest and greenish-white fore-neck, is not unlike *Comatibis comata* of Northern Africa, Arabia, and the Euphrates, which is metallic greenish-black with a large bronzy-red patch on each wing, a fine nuchal tuft of narrow feathers, red bill, feet, and bare skin of the head and throat. There is some question here as to the colour of the naked spaces. *Nipponia nippon*, of East Siberia, Corea, Japan, China, and Formosa, is white with pinkish remiges and rectrices; a long pendent crest graces the nape, the bare face is vermilion, the bill black with red tip, while the feet are lighter red. *Graptocephalus davisoni* of the Burmese Countries and Cochin China and *Inocotis papillosus* of India are both dusky brown, with bluish-black wings and tail, a white patch on the wing-coverts, greyish bill, and red feet; but whereas in the former the black naked head is separated by a bare bluish-white collar from the neck, in the latter the hinder crown is dotted with red papillae. *Carphibis spinicollis* of Australia is black with purple and coppery sheen, the sides of the downy neck, the tail, and the abdomen being white, and the feathers of the chest, which are converted into stiff straw-like processes, yellowish. The naked head and throat are black, the bill is black with brown bars at the base, the tibiae are crimson, and the metatarsi dusky. The huge *Thaumatibis gigantea* of Cochin China is blackish-brown glossed with green, and shows much grey on the wing; the scapulars are decomposed and the head and upper neck bare; the nape is crossed by black bars, and the bill and feet are dull red. *Ibis aethiopica*, the Sacred Ibis of the ancient Egyptians, of which mummies are so often found in the temples, represented to that people the moon-god Thoth, and is now the Abou-Hannes or "Father John" of Abyssinia. It inhabits the Ethiopian Region,

being most plentiful on the Upper Nile, though wandering to the Persian Gulf, Egypt, and Algeria. The bare head and neck, the bill, feet, and tips of the primaries are black: the decomposed inner secondaries and scapulars, which in summer curve gracefully over the hinder parts, are iridescent black, the remainder of the plumage is white. *I. bernieri* of Madagascar, and probably Aldabra Island, has white primaries, as has *I. melanocephala*, ranging from India and Java to Japan. The latter, moreover, develops in the breeding season a ruff of long plumes on the fore-neck, similar to that of *I. molucca* of Australia, Papuasia, and Ceram, which is distinguished by ten pink bars crossing the occiput and nape, and pink spots on the crown.

The sexes are similar, but young Ibises are comparatively dull, and have feathered heads and necks, while crests and ornamental plumes are generally absent. In immature examples of *Ibis* and elsewhere the head and neck are black and white, in *Nipponia* the plumage is apparently grey, in *Eudocimus* chiefly brown.

Sub-fam. 2. *Plataleinae*.—Spoonbills are shy gregarious birds, frequenting creeks of the sea or marshes, where they may be seen wading ankle-deep in water, hunting for the fish, frogs, crustaceans, molluscs, beetles, and insect-larvae on which they live, or searching the ground in drier spots. They walk sedately, and fly with easy flapping action and outstretched head and legs, now and then rising spirally to float aloft: while swimming, perching, or standing on one leg are ordinary habits. In feeding, the beak is moved from side to side in semicircular fashion, the body acting in unison. There are no true vocal muscles, the voice being a harsh quack or deep Heron-like note; but a clattering of the bill is heard at times, less noisy than in Storks. The nest, when in reed-beds, is a mass of twigs, flags, and the like, placed on the ground or on low bushes; but it is commonly a large platform of sticks in a tree, the three to five roughish eggs being dull white with red-brown spotting. Colonies are nearly always formed.

Platalea leucorodia, the Spoonbill, which once bred regularly in England, ranges over Central and Southern Europe and Northern Africa, to Central Asia, Ceylon, and China; *P. regia* inhabits Australia, and probably Borneo, Celebes, the Moluccas, and New Guinea, straying also to New Zealand; *P. minor* occurs in China, Corea, Japan, and Formosa; *P. alba* in the Ethiopian Region with Madagascar. The plumage is white, with bare lores,

orbits, and throat, and a fine nuchal crest in the breeding season, the fore-neck being tinged with buff, except in the last-named. *P. leucorodia* has yellow naked areas, black feet and bill, with yellow bars and tip to the latter; *P. minor* differs in having the

Fig. 30.—Spoonbill. *Platalea leucorodia*. $\times \frac{1}{6}$.

neck-feathers produced to a point on the black throat; *P. regia* has the above parts, except a portion of the orbits, black, and *P. alba* all of them red. The maxilla is transversely corrugated, at least in summer.[1] *Platibis flaripes* of Australia is white, with no crest, but with black outer webs to the decomposed inner

[1] For this genus see Ogilvie Grant, *Ibis*, 1889, pp. 32-58.

secondaries, and elongated straw-yellow plumes on the fore-neck in the nuptial period: the naked forehead, ocular region, throat, bill, and feet being yellow: while a black line separates the gorge from the feathered parts in the adult. *Ajaja rosea* of tropical America, which reaches the South-East United States, is rose-pink, with white neck, back, and breast, pinkish-buff tail, and carmine wing- and tail-coverts; the bare head is yellowish-green, the orbits and throat are orange, the bill is greenish-blue with grey and black base, the feet are crimson, while a curly pink tuft is developed on the fore-neck in the breeding season.

The female Spoonbill is like the male. The young seem to be duller, with no crest or ornamental plumes; in some cases the primaries are tipped with black, in *Ajaja* the head is entirely feathered.

Of fossil forms, *Ibidopsis* occurs in the Upper Eocene of England, *Ibis* and *Ibidopodia*, the latter of which connects the Ibises with the Storks, in the Miocene of France, *Ibis* also in that of Bavaria, *Protibis* in that of Patagonia, *Plataleа* in the Queensland drifts.

Fams. X.-XI. The Sub-Order PHOENICOPTERI, including the **Phoenicopteridae** or Flamingos and the extinct **Palaelodidae**, stands midway between the Storks and the Geese, having been on that account termed AMPHIMORPHAE by Huxley, a term equivalent to the ODONTOGLOSSAE of Nitzsch. The extraordinary Flamingos have very long slender necks and unwieldy-looking bills, high at the base and abruptly bent down in the middle, the maxilla being readily movable and in some cases smaller than the nearly immovable grooved mandible—a condition of affairs seldom found elsewhere, and correlated with the peculiar method of feeding. As in the Anseres, the beak—which is short and straight in the young—is covered with a soft membrane, and ends in a black nail-like process rich in nerves, the margins being furnished in the adult with horny lamellae. The legs are unusually long, with nearly bare tibiae and laterally compressed metatarsi, covered with broad scutes which become smaller posteriorly; the hallux is absent or somewhat elevated and reduced, while the short anterior toes are fully webbed and have flat stunted claws. The wing is fairly long, with twelve primaries and about twenty-two secondaries; the tail is even, with fourteen small weak rectrices. The furcula is U-shaped, the nostrils are pervious, the tongue is thick, an aftershaft is present, and the syrinx is tracheo-bronchial.

Phoenicopterus ruber, ranging from Florida to Pará and the Galá-

pagos, is light vermilion with brighter wing-coverts, the yellowish bill having a black tip and the feet being red; the other forms are rosy-white with the coverts scarlet, while all have black remiges; the naked orbits and lores vary from rose-coloured to yellow, *P.*

FIG. 31.—Flamingo. *Phoenicopterus roseus.* $\times \frac{1}{11}$.

minor, *P. andinus*, and *P. jamesi* having feathered chins. *P. roseus*, recorded thrice from Britain and several times from North Germany, while extending from Central Europe, the Canaries, and Cape Verds to the whole of Africa, Lake Baikal, India, and Ceylon, has red feet and a pink bill with black tip; *P. chilensis*, of America south

of Central Peru, Uruguay, and perhaps Brazil, has green-grey metatarsi with red joints, the black on the bill reaching above the bend; *P.* (*Phoeniconaias*) *minor*, of the Ethiopian Region, Madagascar, and North-West India, is very like *P. roseus*. *P.* (*Phoenicoparrus*) *andinus*, of the Andes of Bolivia, Chili, and Argentina—the largest species of the Family—and *P. jamesi*, of South Peru and Chili, lack the hallux, and have the base of the bill yellow and the middle red, with yellow and red feet respectively.

The young are chiefly greyish- or buffish-white, with brown or black markings, rarely seen beneath, and duller naked parts; the adults are uniformly downy, the nestlings white and woolly.

Flamingos are shy birds, sometimes found singly, but usually in immense flocks, which fly gracefully in V-shaped formations with alternate flapping and gliding motion, or circle around with outstretched neck and legs after rising with some difficulty. They spend their time chiefly in wading, the gait being slow and stiff: yet they can swim on occasion, and give evidence of their Anserine affinity by loud harsh cries, much resembling the "gaggling" of Geese, and by their helpless state in late summer, due to the loss of the flight-feathers. Very curious is their method of feeding, the head being completely inverted and directed backwards, as they tramp about in the shallows and seek for the aquatic herbage, frogs, crustaceans, molluscs, and so forth, which constitute their food, the lamellae of the bill acting as a sifting apparatus. The breeding colonies are situated on some lake, salt lagoon, or "marisma" of little depth, with bare shores, the conical or cylindrical mud nests being slightly hollowed at the top and varying in height from two to fifteen inches according to the amount of water. Several hundred individuals commonly breed together, though they not infrequently change their quarters annually; they are said to fashion the nest with their feet, and lay one or two eggs with bluish shell and chalky incrustation, incubation lasting four weeks or more. Mr. Abel Chapman,[1] Sir Henry Blake,[2] and Mr. Maynard[3] have shewn that the bird sits with her legs doubled under her, and her head directed forwards, though reliable persons have asserted that the feet hung down, and Dampier (prior to 1683) alleged that the parent stood erect and covered the structure with her rump. Eggs are often dropped

[1] *Ibis*, 1884, pp. 88, 89. [2] *Nineteenth Cent.* xxii. 1887, pp. 886-890.
[3] *Naturalist in Florida*, 1884, No. 1.

promiscuously by the hen. The young run from the shell, and even when fully grown can be driven in flocks by intending captors.

Of extinct forms the allied *Agnopterus* occurs in the Upper Eocene of France and possibly of England; *Helornis*, with somewhat shorter bones, in the Lower Miocene of France and the transition beds of the two formations, as well as the Middle Miocene of Germany; and several species of *Phoenicopterus*, in the French Lower Miocene, the Pliocene of Oregon, and the Mare aux Songes in Mauritius. Lastly, there are five species of *Palaelodus*, constituting the family *Palaelodidae*,[1] in which the bill was probably straight, and the tibia and metatarsus were much shorter than in *Phoenicopterus*, but the toes longer. They are found in lacustrine deposits of the French Lower Miocene and the German Middle Miocene, while remains resembling them, to which the name *Scaniornis* has been given, are met with in the Chalk of South Sweden.[2]

Order VI. ANSERIFORMES.

The Order Anseriformes consists of the Sub-Orders PALAMEDEAE and ANSERES, each containing a single Family, *Palamedeidae* and *Anatidae* respectively. Lying between the Ciconiiformes and the Falconiformes, the connexion of this group with the former is much the most easily recognised, as it shows decided affinities to the PHOENICOPTERI, while between the ANSERES and the Birds of Prey there occurs one of those gaps common to every linear system of classification. All the members agree in having the furcula U-shaped and the nostrils pervious. The large spiral penis is unique among the Carinatae, though comparable with that of the Ratitae. The down is uniformly distributed in both adults and nestlings, the aftershaft is rudimentary or absent, the tongue is thick and fleshy, and has bristly sides in the *Anatidae*; while the possession of two pairs of sterno-tracheal muscles is a marked point of distinction amongst Carinate Birds. All the species are aquatic, and live almost entirely on vegetable matter. The young leave the nest within a few days, or even hours.

Fam. I. **Palamedeidae.**—In this group the head is small and the neck long, while the ribs have no uncinate processes, an archaic feature only found elsewhere among Birds in *Archaeopteryx*. The

[1] Milne-Edwards, *Oiseaux Fossiles de la France*, ii. 1868, p. 58.

[2] Dames, *Svensk. Ak. Handl. Bihang*, xvi. 1890, Part IV. No. 1, pp. 4-11.

bill is short and Fowl-like, with a blunt decurved tip, a covering of soft skin, and more or less of a cere; the tibiae are partly naked, the entirely reticulated metatarsi moderately long and fairly stout: the toes are elongated and have strong claws, but only rudimentary anterior webs; the wings are ample and somewhat rounded, with eleven primaries and about sixteen large secondaries; the tail has fourteen broad feathers in *Palamedea* and twelve in *Chauna*.[1] Very noticeable are the two sharp spurs on the carpal portion of each wing, of which the foremost is the biggest; while in the even distribution of the body-plumage this Family recalls the Ratitae and the Spheniscidae. The sexes are alike; the nestlings, where known, are clad in yellowish-brown and grey down, the wing-spurs being developed in the earliest stages.

The following account of the habits of *Chauna cristata*,[2] the Chajá or Chaka, must stand for those of the Family, in default of further details concerning the more northern forms. This striking species is a common resident in the swamps and brackish lagoons of Argentina, where the islands of the intricate morasses often hold flocks of more than a hundred individuals, the separate pairs being said to mate for life. The flight is slow, with powerful strokes of the wing, the birds being greatly addicted to soaring in spiral circles until they are hardly visible, and at times floating lazily upon the breeze. They rise noisily from the ground with laboured action, and are occasionally seen to perch in trees; but they are by nature waders which swim with considerable facility, and, when they do so, their bodies shew well above the water, owing no doubt to the same pneumaticity which causes a crackling noise to be heard when the skin is compressed. The food consists of succulent water-plants, seeds, clover, and so forth. The loud cry, uttered with the head thrown back when the performer is on the ground, may be heard at a distance of two miles, the male giving vent to a "cha-ha" and the female replying with a "cha-ha-li." The regular period for reproduction is the southern spring—September and October—but it is a remarkable fact that breeding takes place also in autumn and even winter; the nest being a massive structure of reeds and rushes slightly hollowed above, and standing some two feet high with its foundations in water, or,

[1] Gibson, *Ibis*, 1880, pp. 165-167: Hudson, *Argentine Ornithology*, ii. 1889, pp. 119-122.

[2] *Chauna* has a dilatation near the middle of the trachea.

in exceptional cases, floating. This nest is placed in some narrow channel or near the side of a lagoon, and contains from four to six oval buffish-white eggs. The female rises silently when disturbed, nor do the parents usually attack an intruder; but wounded birds are dangerous to approach, and make good use of their sharp spurs. The voice of the young is a feeble chirp; they are often trained, as they grow up, to act as guardians to the poultry of their owners. The flesh is coarse and dark, with a duck-like flavour.

Palamedea cornuta, the Horned Screamer, found from Guiana, Venezuela, and Amazonia to Ecuador and Eastern Peru, is glossy black with an admixture of white on the crown, lesser wing-coverts, and carpal edge; greyish foreneck, white abdomen, brownish-grey bill, and ashy feet. The lores are feathered, and a long, slender, yellowish-white horn adorns the forehead. The female is said to have buff on the wing-coverts. *Chauna chavaria* (*derbiana* auctt.) occurs in Venezuela and Colombia; it is glossy slate-black with greyer head and occipital crest, white cheeks and throat, and a little white on the wing. The naked lores are pink, the bill and feet apparently red. *C. cristata* (*chavaria* auctt.) differs in being dark grey, with a black ring round the neck and whitish-grey cheeks and throat. This is the largest form, and is bigger than a Turkey; it ranges from South Brazil to Argentina, and shares with *Cariama* (p. 258) the name of Crested Screamer.

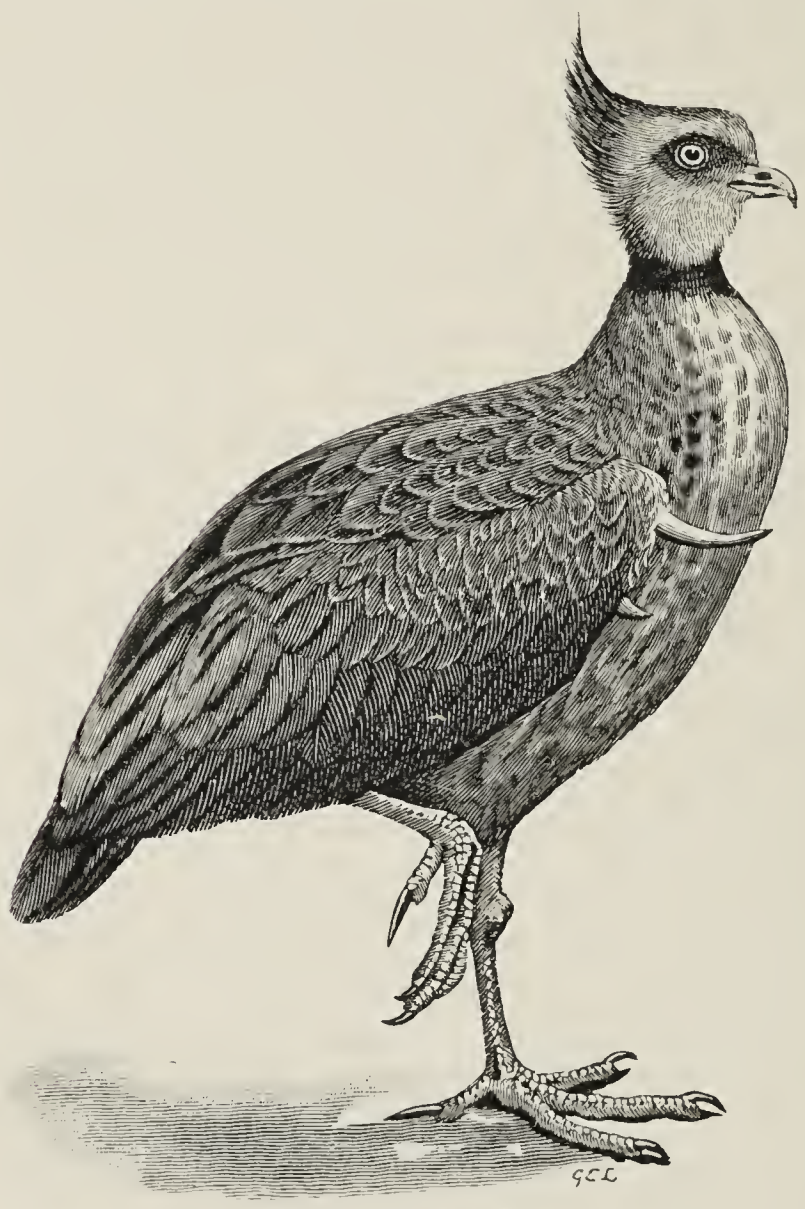

FIG. 32.—Chajá. *Chauna cristata*. $\times \frac{1}{10}$.

Fam. II. The Sub-Order ANSERES contains the single cosmo-

politan Family **Anatidae**, with the Swans, Geese, and Ducks: where, in spite of many attempts at subdivision, the lines of demarcation cannot yet be finally determined. Count Salvadori, however, having lately propounded a carefully-elaborated arrangement,[1] I have adopted his Sub-families in the present volume, viz. (1) *Merginae*, (2) *Merganettinae*, (3) *Erismaturinae*, (4) *Fuligulinae*, (5) *Anatinae*, (6) *Chenonettinae*, (7) *Anserinae*, (8) *Cereopsinae*, (9) *Plectropterinae*, (10) *Anseranatinae*, and (11) *Cygninae*.

The skull is short and robust; while the neck is abnormally developed, with extra vertebrae, in the Swans, and is usually long, though less so in the Sea-Ducks; in the *Merginae* and some *Fuligulinae* the customary posterior notches in the sternum are converted into two complete fenestrae or apertures. The bill is almost entirely covered with a soft sensitive membrane, ending in a horny process termed the nail, the skin being warty in *Anseranas* and *Chen rossi*; *Cereopsis* has a large tumid cere; both sexes of *Cygnus melanocoryphus* and *C. olor* have a knob at the base of the culmen, as have the males of *Plectropterus*, *Tadorna cornuta*, and the domesticated form of *Cygnopsis cygnoïdes*; the same sex of *Somateria spectabilis* has the posterior portion of the maxilla spread into a disk; *Oedemia* has it considerably swollen even in the female: *Cairina* and *Plectropterus* have caruncles on the forehead; *Sarcidiornis* has a fleshy comb at the proximal extremity of the beak in the male; while *Biziura* has a dependent flap on the chin, and a small subgular pouch. The bill is usually broad and depressed, and may be sub-conical, as in many Geese; spatulate, as in *Spatula* and *Malacorhynchus*; or somewhat less dilated, as in *Chaulelasmus*, and so forth. There is a distinct hook at the tip in *Mergus*, *Dendrocygna*, and *Aex*; the culmen is concave in *Marmaronetta* and *Stictonetta*; the nail is bent inwards in the latter and *Erismatura*, while the maxilla may overlap the mandible, or the covering membrane may even hang over the latter, as in *Malacorhynchus*, *Hymenolaemus*, and to a less extent in *Elasmonetta* and *Nesonetta*. The length is very variable, but the thin elongated "sawbill" of *Mergus*, with its serrated edges, is especially remarkable. Most characteristic of the Family is the presence of highly-developed lamellae or transverse tooth-like processes on both maxilla and mandible, which are visible when

[1] *Cat. Birds Brit. Mus.* xxvii. 1895, pp. 23, 24.

the jaws are closed in many cases, and are comparable to the similar formations in *Prion* (Procellariidae) and the Phoenicopteridae. They act no doubt as a sifting apparatus, but may assist in nipping off herbage and gripping fish, the piscivorous Merganscrs having them directed backwards. The metatarsus is normally short or moderate, though occasionally long, as in *Plectropterus* and *Dendrocyena;* it may be stout and roundish, as in *Anser,* or laterally compressed, as in *Fuligula;* and is usually reticulated with transverse scutellae in front, though wholly reticulated in the Cygninae, Anserinae, and *Dendrocyena.* The anterior toes are fully webbed, *Anseranas* and *Cereopsis* alone having the foot semi-palmated; the hallux is short and elevated —except in the former species, where it is long and incumbent —and possesses a broad membranous lobe in the Merginae, Merganettinae, Erismaturinae, and Fuligulinae, while a very narrow membrane may be observed in the Anatinae and Chenonettinae. The claws are as a rule small and curved, but are long and sharp in *Anseranas, Dendrocyena, Nettopus,* and *Pleetropterus.* The wings vary considerably, but are usually ample and rather long, though short in *Cosmonetta, Erismatura,* and *Taehyeres;* the number of primaries is eleven, and of secondaries from fifteen to twenty-eight, a horny spur being developed on the pollex, or even on the index, in *Plectropterus, Sareidiornis, Chenalopex,* and *Merganetta.* The tail is, generally speaking, short, and may be narrow and pointed, as in *Anas, Dafila,* and *Harelda;* in *Aex, Querquedula, Tadorna,* and so forth, it is rounded; in *Chenalopex* squarer; and in *Sarcidiornis* and *Asarcornis* more cuneate. In *Taehyeres* the two median rectrices are long and recurved, and in the males of *Harelda* and *Dafila* they are inordinately produced; while all the feathers have spiny shafts and narrow webs in the Erismaturinae and Merganettinae. The number varies from twelve to twenty-four, with even more in Swans. In *Eunetta* the upper and under tail-coverts exceed the tail itself.

The formation and disposition of the trachea[1] are of great importance. *Cygnus musicus, C. buccinator, C. bewicki,* and *C. columbianus* have a peculiar cavity in the sternum, while the windpipe, entering in front of the clavicles, traverses and retraverses the swollen keel, which in old birds it penetrates to its furthest extremity, the direction being changed in the two last from vertical

[1] For a general account, see A. Newton, *Dict. Birds,* 1896, pp. 983-985.

to horizontal. *Anseranas* shews a double loop in this organ,[1] and in the males of many Ducks an enlargement is found at its junction with the bronchial tubes, consisting of a round bony structure, termed the *bulla ossea* or "labyrinth." Similar structures have been noticed in *Chenalopex*, *Dendrocygna*, *Chloëphaga*, *Plectropterus*, and *Sarcidiornis*; and in the Fuligulinae they shew apertures with membranous coverings; *Metopiana peposaca*, *Mergus merganser*, *M. serrator*, *Tadorna cornuta*, *Oedemia fusca*, and (doubtfully) *Oc. perspicillata* are stated to have an additional bulb, but *Oc. nigra* has none. *Clangula glaucion* and the Merginae have a swelling in the middle of the trachea.

The headquarters of the Family are in the north, while Dr. Sclater's calculations,[2] though modified by subsequent discoveries, give a good idea of the distribution. He assigns as residents about seventy-seven species to the Northern Regions, forty-one to the Neotropical, twenty-nine to the Australian, twenty-two to the Ethiopian, and twelve to the Indian; twenty Geese out of thirty-three, seven Swans out of ten, and twenty-six Sea-Ducks out of thirty-one belonging to the first. Polynesia is especially poor.

The Anatidae are for the most part of similar habits, and frequent seas, lakes, rivers, and watery spots generally, being found to a great extent in winter on the shore, especially where mud-flats are exposed by the ebbing tide, and beds of such food-plants as *Zostera* (grass-wrack) are uncovered. Large flocks, which include many migrants, are formed at that season, and in spring the ganders and drakes commonly collect into parties while the female is incubating, which she does during twenty-one to forty-two days. Later in summer the majority of the Family shed their quills simultaneously, and conceal themselves until again capable of flight, the males then becoming dull in colour for several weeks, and resembling the other sex.[3] *Merganetta* is found only on the torrents of the Andes; *Hymenolaemus* and *Salvadorina* being also residents on mountain streams. The noisy flight is extremely powerful, and much swifter than it appears, the wedge-shaped formation which Geese affect being especially noticeable; some forms, however, are practically flightless, such as *Nesonetta* and the adult Steamer-Duck (*Tachyeres*). All the Anatidae swim exceptionally well, diving being carried to its perfection in the marine Fuligulinae; while the parti-

[1] W. A. Forbes, *P.Z.S.* 1882, p. 350.
[2] *P.Z.S.* 1880, p. 533.
[3] *Supra*, p. 4.

ally-submerged position with erect tail when feeding is known to every one. The various Swans have a whooping, trumpet-like, or hissing note; that of Geese is a harsh cackle, a gaggling sound, a clang or a "honk." Ducks do not always quack, but have whistling or grating cries in addition. The usual food is vegetable, consisting of grass, *Chara, Zostera, Ulva*, and other plants; but Mergansers live chiefly on fish, and the bill of fare is varied by grain, pulse, berries, frogs, insect-larvae, worms, molluscs, and crustaceans. The nest is placed on the ground in thick herbage, or sometimes almost in the water; holes in banks, hollow trees, or even branches at a slight elevation being chosen in certain cases: it is composed of heather, grass, moss, leaves, or rarely seaweed and twigs, and is lined with down, added gradually from the parent's breast during incubation. The eggs, which vary in number from two (*Biziura*) to about a dozen, are smooth and hard-shelled, with a plain white, creamy, or green coloration, and are commonly covered when left. The young return for a time to the nest at night, and are carefully tended by the female, who is occasionally assisted by the male, especially in Swans. It is not certain how tree-building Ducks convey the nestlings to the water, though it has been stated that they are carried in the bill; but it is no uncommon sight to see ducklings and cygnets climb upon their mother's back and hide beneath her wings when danger threatens.

The sexes in Swans and Geese are usually alike, though exceptions occur, as in *Chloephaga;* in Ducks the male is generally much the finer bird, and has peculiar decorations, such as the elongated scapulars and rectrices of *Harelda* and *Dafila;* the sickle-shaped secondaries of *Eunetta, Heniconetta, Arctonetta,* and *Somateria;* the stiff feathers on the face in the last three and *Camptolaemus;* the curly tail of *Anas boscas;* the crest, ruff, and "sail" of *Aex galericulata;* or the crests of many Fuligulinae and Merginae. Some females have similar but less striking adornments. Among the many instances of fine coloration may be mentioned the Red-breasted and Emperor Geese, the Harlequin, Mandarin, Pink-headed and Shoveller Ducks, the Sheld-Drake (Fig. 34), and the Goosander; while most Swans are pure white. The blue, green, or white speculum—or wing-bar—in various Ducks adds greatly to their appearance. The young are comparatively dull, the nestlings being thickly covered with yellowish down, furnished with barbs and barbules; the colour is, however, whitish or grey

in Swans, and occasionally brown, blackish, or greenish elsewhere.

Sub-fam. 1. *Merginae*.—The commonest British species is *M. serrator*, the Red-breasted Merganser, which breeds plentifully in the Scotch Highlands and Ireland, and ranges over the northern parts of the globe, extending in winter from the Mediterranean to China, Japan, and the Bermudas. The head is glossy green-black with a long hairy crest, the neck is white with a black nuchal line, the upper parts are chiefly black, the large white wing-patch is crossed by two black bars, while white feathers edged with black adorn the sides of the breast, which is rufous with black streaks, and becomes reddish-white towards the abdomen. The female is brown, with reddish head and nearly white under surface. The bill and feet are red in this species and the next. *M. merganser*, the Goosander, nests sparingly in North Scotland, and has a similar range to the above abroad, though less abundant; it has a green-black head with little crest, a black back, almost white wings, and pinkish-white lower neck and under parts. The female has a blue-grey back, and lacks the wing-bars of the hen Merganser. The American species, with a black alar band, is separated as *M. americanus*, and the Central Asiatic form as *M. comatus*; *M. australis*, of the Auckland Islands, has a brown head and neck with long crest, a dark grey body with white bands below, a white speculum, and red-brown bill and feet; *M. brasilianus*, of Brazil, is black above with two bars on the white speculum, and white below barred with black, the bill and feet being greenish-black. The female has the crown and long occipital feathers brown. *M. albellus*, the Smew, ranging from Lapland eastward to Bering Island, but not to North America, and found in winter from Britain and the Mediterranean to North India, China, and Japan, is mainly white, with blackish cheeks, occiput, back, remiges, rectrices, and two crescentic bands on each side of the breast, the bill and feet being lead-coloured. The female has a red-brown head and nape, brownish-grey upper parts, and a smaller crest than the male. *Lophodytes cucullatus*, the Hooded Merganser of North America, which has strayed to Greenland and Britain, has black upper and white under parts; the dense compressed crest has the posterior part white in the middle, the white speculum shows a pair of black bars, two black crescents mark each side of the breast, the long inner secondaries

are black and white, the bill is black, the feet are brown. The female has a red-brown crest, brown chest, and upper surface.

The members of this Sub-family are shy and wary sea-birds, seldom found on fresh water except during the breeding season; they fly well, walk clumsily, and dive admirably, swimming low in the water. The cry is a plaintive whistle or loud harsh note; the food consists of little but fish. The Red-breasted Merganser breeds in holes in banks, or among grass and heather, laying up to ten brownish-green eggs; the Goosander deposits from eight to thirteen, of a fine creamy colour, in similar places, or in hollow trees; the Smew and the Hooded Merganser prefer the latter, and lay some eight creamy or ivory-white eggs respectively.

Sub-fam. 2. *Merganettinae.*—*Salvadorina waigiuensis* of Waigiou has the head and neck blackish-brown with paler edges to the feathers, a white chin, black upper parts barred with white, and buffish-white under parts with brown abdominal spots; the sides are barred with black, and the black and green speculum is bounded by two white bands. The bill and feet are yellowish-brown. *Hymenolaemus malacorhynchus*, the Blue Duck of New Zealand, is lead-blue, tinged with olive on the head and spotted with chestnut on the breast, the outer secondaries shewing a little white and the inner black. The whitish bill has the dependent membrane (p. 111) black, the feet are brown. This peculiar and tame torrent-duck is rarely seen on the sea, though it can fly from one gorge to another; it swims and climbs the boulders with ease, has a whirring note, and feeds chiefly on insect-larvae. It deposits five creamy eggs in holes or under tussocks of grass. *Merganetta armata*, of Chili, is black above with white edges to the feathers, and rufous with black streaks below: the head and neck are white, with black crown, vertical eye-stripe, throat, chest, and streaks down the back and sides of the neck; the bronzy-green speculum has a white band on each side, the bill is yellow, the feet are reddish. *M. frenata*, of Chili, is very similar; *M. turneri*, of South Peru, has a white throat and rufous edges to the feathers of the back; *M. leucogenys*, of Peru, has a whitish throat and breast; while *M. garleppi*, of Bolivia and Tucuman, and *M. columbiana*, of Colombia, Ecuador, and Venezuela, differ but little from the last-named. The females are grey and black above and uniform cinnamon below. These curious Ducks are restricted to the torrents of the Andes, where they

are found in pairs, plunging in the cascades, diving below the boulders, or stemming the impetuous current with equal facility.

Sub-fam. 3. *Erismaturinæ.*—*Biziura lobata*, of Tasmania and Australia—except the north- is brown with buff mottlings, the bill and its leathery appendage being greenish-black and the feet dusky. The smaller female has less chin-lobe. This species frequents the sea as well as lakes, roosts in trees, and when diving remains long submerged; the food consists of mussels, leeches, and aquatic

Fig. 33.—Musk Duck. *Biziura lobata.* ×$\frac{1}{7}$. (From *Nature*).

worms; the note resembles the dropping of water. The nest, placed on a stump or in a bank, contains two olive eggs; the musky smell of the sitting female having suggested the name of Musk Duck.

Erismatura contains seven "Lake Ducks," inhabitants of fresh-water lagoons, which dive like Grebes, and remain with only the bill exposed; they are often tame, and when disturbed splash along the surface like a Moor-hen, to settle again almost immediately; in swimming the spiny tail is carried erect, suggesting a comparison to a "two-peaked saddle." The note is said to be a curious inward sound; the food is of fish,

molluscs, and insects; while the nest, built in rushy places, contains up to ten coarse-grained white eggs.[1] *E. leucocephala*, ranging from the Mediterranean to Southern Siberia, and in winter to North-West India or, exceptionally, to Holland, is rufous-brown with black vermiculations and bars, black crown and neck-ring; the rest of the head and neck being white, the bill blue, the feet dusky. *E. jamaicensis*, of Central and temperate North America, *E. ferruginea*, of Bolivia and Peru, *E. aequatorialis*, of Ecuador, *E. maccoa*, of South and East Africa, *E. vittata*, of southern South America, and *E. australis*, of South and West Australia and Tasmania, are brown with greyer belly mottled with dusky; the head and neck being black, except for the white cheeks and chin in the first-named and the chin only in the second and third. *E. acquatorialis* has white instead of rufous under tail-coverts; *E. maccoa* has white axillaries as opposed to grey in *E. rittata*; *E. australis* is much deeper chestnut. The females are decidedly duller. *E.* (*Nomonyx*) *dominica*, of Central, Southern, and, accidentally, Eastern North America, has the feathers of the back black in the middle and a white speculum. *Thalassiornis leuconota*, of South and East Africa with Madagascar, is variegated with black and ochreous yellow, the rump being white, the wings, tail, and feet brownish, the bill blue-grey. It dives much, flies little, and lays about four greenish eggs.

Sub-fam. 4. *Fuligulinae.*—*Somateria mollissima*, the Eider Duck, breeds commonly in Northern Britain, and thence to the Taimyr Peninsula eastwards and the Coppermine River westwards; birds from North-East America being separated as *S. dresseri*; while *S. v-nigrum*, differing in its black V-shaped throat mark, occupies North-East Asia and North-West America. In winter the first-named strays as far as South Europe and the United States; the second has occurred in Holland. The male Eider has white upper parts and buff chest, black lower back, abdomen, and crown, the last showing a white streak; the wing- and tail-quills are brown, the stiff nape-feathers green, while the plumage extends in a peak on the culmen. The female is brown, with blackish bands or stripes and two white alar bars. The bill and feet are olive-green. *S. spectabilis*, the King-Eider of the Northern Arctic Regions, rarely wandering in winter to Britain, France, New Jersey, and California, has the head blue-grey with green and white cheeks, and a black chevron on the throat; the remaining portions

[1] For notes on the courtship, and so forth, see J. G. Kerr, *Ibis*, 1890, pp. 359, 360.

being black except for the buff breast, white neck, upper back, lesser wing-coverts, and a patch on each side of the rump. The feet and the bill, with its vertical black-edged disc at the base, are orange. The female is redder than in the Eider, with a more feathered culmen. These species are essentially maritime, only coming to shore to breed; they are semi-gregarious, and form a nest of grass and rubbish, a quantity of down underlying the five to eight oily-green eggs. Eider-down is chiefly procured from Iceland, Greenland, and protected islands in Norway. The flight is low and heavy, the food consists of mussels, starfish, and other sea creatures. *Arctonetta fischeri*, the Spectacled Eider of Alaska, is chiefly white, with dark grey rump and under parts; the head being varied with green and decorated with pendent bristly plumes on the occiput, stiff frontal and loral feathers, and a satin-like quadrangular patch outlined with black on each side. The tail- and wing-quills are brown, except the falcate inner secondaries; the feet are brownish, the bill is orange in the male. The female is fulvous and black with bluish beak. *Heniconetta stelleri* breeds on the Arctic shores mainly between the Taimyr Peninsula and Alaska, and has strayed to Britain and even France. The head, falcate scapulars, and inner secondaries are white with blue-black outer webs to the two latter, the rest of the wing-quills and tail brown; the back, throat, neck, and a spot on each side of the breast purplish-black; the lores and short occipital tuft green, the lower parts mostly tawny. The female is brown with darker markings, and duller wing-bar. *Camptolaemus labradorius*, the extinct "Pied Duck" of the North Atlantic coast of America, was black, with white head, neck, chest, scapulars, and most of the wings except the primaries; it had a black stripe down the crown and stiff cheek-feathers. The brownish female shewed a white speculum.

Oedemia nigra, the Scoter or Black Duck, which nests in North Scotland, ranges over Northern Europe and Asia to the Taimyr Peninsula, sometimes reaching the Azores and the Mediterranean in winter. It is black, with a yellow nasal patch and a swollen base to the culmen, the female being dark brown with greyish face and throat, and no protuberance or yellow mark. *Oe. americana* of North-East Asia and North America, migrating to Japan, California, and New Jersey, has the knob yellow with red sides, while the female is grey-brown. *Oe. fusca*, the Velvet Scoter, extends from Scandinavia to West Siberia, and occurs

exceptionally in Greenland, visiting us in winter, though rarely reaching Spain and the Adriatic; it is black with a white speculum and mark under each eye, the bill being orange with black posterior swelling and lateral line, and the feet dull crimson-red. The brownish female has the white speculum, but a brown bill. The very similar *Oe. deglandi*, of North-East America, has the base of the maxilla entirely feathered, as has the still blacker *Oe. carbo*, of North-East Asia. *Oe. perspicillata*, the Surf-Scoter, accidental in Britain and North-West Europe, inhabits the far north of America and the Asiatic coasts of Bering Straits, wintering down to Jamaica and California. The black plumage is relieved by white patches on the crown and nape; there is a black mark on each side of the crimson, scarlet, and orange bill, the feet are crimson, orange, and black. The brown female has yellowish-orange feet. Scoters are gregarious birds, usually found some way from land except when breeding; the flight is strong; the note guttural, but softer in spring; the food consists of fish, molluscs, and crustaceans. They nest near fresh-water lakes and pools, among heather or grass, and lay from five to eight yellowish-white eggs.

Cosmonetta histrionica, the Harlequin Duck of Iceland, North-East Asia, Arctic America, and possibly the Urals, which reaches Japan, the United States, and exceptionally Britain and elsewhere in winter, is grey-blue, curiously marked with black and white on the head, neck, wings, and chest; the superciliary streaks and flanks are chestnut, the speculum being purple, the bill plumbeous, the feet brown. The female is brown with whitish cheeks and mottlings below. The habits of tumbling and diving in rocky torrents have been well described by Mr. Belding;[1] the nest is in banks or under boulders, and contains seven or eight buff eggs. *Harelda glacialis*, the Long-tailed Duck of the Arctic Regions, which appears to breed in Shetland, and in winter even reaches the Mediterranean and China, but more commonly the Caspian, Lake Baikal, Japan, and the middle United States, is at that season white with brownish patches on the sides of the neck, brown-black back, wings, central rectrices, and chest. In summer the crown, neck, and scapulars become brown, with rufous edges to the dorsal plumage. The bill is pinkish and black, the feet are bluish. The female is brown, with white ocular region, neck-ring, and lower parts. This noisy species is called, from its musical chattering note, "Calloo" in Shetland

[1] *Water Birds N. Amer.* ii. Boston, 1884, p. 56.

and "Old Squaw" in America; it flies very swiftly and nests near water, laying from six to twelve oblong grey-green eggs.

Clangula glaucion, the Golden-Eye, not yet proved to breed in Britain, though it does so in North Germany, the Caucasus, Siberia, and Maine, besides the Arctic Regions generally, is found in winter to the Mediterranean, and thence to North India, China, Japan, Mexico, and Cuba. The glossy head is green, with a slight crest and white cheek-patches: the upper parts are black with white on the wings and scapulars, the lower surface being white, the bill black, the iris golden, the feet orange. The female has the head and back brown, the chest grey. Similar to *Fuligula* in general habits, the Rattlewing, as it is often termed from its noisy flight, is more partial to inland waters in winter, while for breeding it prefers hollow trees, or nest-boxes set up by Lapps and Finns, the ten or twelve eggs being bright green. *C. islandica*, the ordinary species in Iceland, differing from *C. glaucion* in its purplish head, inhabits Arctic America also, and winters in the United States, rarely straying to Britain or the rest of Europe. *C. albeola*, the Buffel-head, of North America, which has visited the Commander Islands and Britain, has the head purplish-green with a large white occipital patch, the iris brown and the feet pinkish. It breeds to the northward, the eggs being whitish.

Tachyeres cinereus, the Logger-head or Steamer Duck, of Chili, the Falklands, and Straits of Magellan, is grey in both sexes, with lighter head, rufous throat, white secondaries and belly, orange-yellow bill and feet. The narrow median rectrices are curled up, the wings very short; while the adults apparently lose the power of flight. Darwin well describes the noisy splashing action, the rapid and flapping swimming movements, the weak diving powers, the strong beak adapted for extracting shell-fish, and the voice like that of a bull-frog.[1] From seven to nine eggs are laid among herbage or low bushes.

Fuligula marila, the Scaup, of Northern Europe, Asia, and America, which migrates to the Mediterranean and Black Seas, North India, China, and Guatemala, has the head, neck, and chest greenish-black, the back vermiculated with black and white,[2] the wings and tail dusky, the speculum and under parts white, the bill and feet plumbeous. The female is chiefly brown above, with

[1] *Voy. Beagle* (1890 ed.), p. 244; cf. Cunningham, *Voy. Nassau*, 1871, pp. 91-97.

[2] Fine alternate dusky and white lines produce a grey effect at a short distance.

white round the base of the bill. *F. affinis*, of North America, has the head purplish; *F. cristata*, the Tufted Duck of the whole Palaearctic area, breeding freely in Britain and apparently in the Abyssinian highlands, while wintering in India, Japan, China, the Malay Archipelago and Polynesia, is distinguished by an occipital crest, and in the male by a black back. *F. novae zealandiae*, of New Zealand, the Auckland and Chatham Islands, has a purple and green gloss above, a few white dots on the back, and rufous-brown abdominal feathers, the latter being brown and white in the female. *F. collaris*, of North America generally, has a violet tinge on the black portions, a chestnut collar, a blue-grey speculum, and white under parts barred with dusky; the bill shows two whitish bands; the female has white lores and throat.

Nyroca ferina, the Pochard, which breeds not uncommonly in Britain, ranges from Iceland to Japan, and in winter to North Africa, India, and China; it has a chestnut head and neck, a black gorget, and upper parts finely freckled with black and white; the speculum is grey, the quill-feathers and rump are black, the lower parts greyish-white; the bill is black, banded with dull blue, and the feet are bluish. In the female, or Dunbird, the head, neck, and chest are dull reddish and the back browner. *N. americana*, of North America, has a purple shade on the head and neck, a white belly, and no black at the base of the bill. The female has a grey-brown head. The larger *N. vallisneria*, the Canvas-Back of the same country, which breeds in the north-west, has the crown and comparatively long bill black. The female has some white on the head and neck, and is vermiculated with white on the back. *N. baeri*, of Eastern Asia, has a green-black head and neck, but is chiefly brown, with a black-edged white speculum and whitish wing-quills, the female being duller with a chestnut cheek-patch. *N. africana*, the White-eyed Duck of British Lists, breeds from Central Europe to the Mediterranean basin, and from the Ob Valley to Kashmir, wintering southwards to the Canaries, Abyssinia, and Arrakan. It has a chestnut head, neck, and chest, a white spot on the chin, blackish-brown upper parts, a brown collar, a black-edged white speculum, a little white on the primaries, and white lower surface, the bill and feet being plumbeous and the irides white. The female is duller with browner head. *N. innotata*, of Madagascar, has a darker head and no chin-spot. *N. australis*, of most of the Australian Region, is not dissimilar, but has a brown tip

to the white speculum and some brown on the belly. *N. brunnea*, of South and East Africa, is brown, mottled with grey above, the head and upper neck being dark purplish-chestnut, the lower neck black, the speculum white with a black posterior band. Some white shows on the primaries, and the bill and feet are plumbeous. The female has white at the base of the bill, on the throat, and behind the eye. *N. nationi*, of Peru, is hardly distinct.

The majority of these two genera are wary sea-birds, though breeding inland; they feed at dawn or dusk on aquatic plants and seeds, molluscs, insects, and even small fish and frogs, chiefly obtained by diving, wherein they are great adepts. *Vallisneria spiralis*, a plant largely eaten by the Canvas-Back, accounts for its specific name and possibly for its flavour. The note is a grating or guttural sound, varied by a low whistle; the nest is generally close to water, and contains from six to thirteen green eggs. *N. africana*, *N. australis*, and *Fuligula novae zealandiae* are rather more skulking species with weaker flight, rarely found at sea.

Metopiana peposaca, of South America, northward to Chili and South Brazil, is black with grey vermiculations above and on the belly, the cheeks and upper neck are purplish, the speculum and inner primaries chiefly white, the bill and its swollen base carmine, the feet yellow. The female is brown, with whitish under parts and grey on the wing. It frequents marshes on the Pampas, has a rapid heavy flight, utters a long hoarse note, and lays a dozen creamy eggs.

Netta rufina, the Red-crested Duck, found from the Mediterranean to the Caspian and Turkestan, or to India in winter, rarely occurs in Britain or North Europe, and is recorded once from America: it is chiefly greyish-brown above and blacker below, with a large crest on the chestnut head, white speculum and sides, red beak and feet. The crestless female is duller, with whitish cheeks and throat.

Sub-fam. 5. *Anatinae* or typical Ducks.—*Heteronetta atricapilla*, of South Brazil, Uruguay, Chili, and Argentina, is dark brown above with black head and rufous vermiculations, and white below with dusky markings; the tips of most of the wing-feathers are white, the bill is blackish with basi-lateral flesh-coloured spots, the feet are brownish. The female's head is brown. *Stictonetta naevosa*, of West and South Australia and Tasmania, is brown with freckles and spots of white in either sex. *Marmaronetta angustirostris*, ranging from South Europe and North Africa to India, and

occurring in the Canaries, is greyish above, with brown and buff marblings, and whitish below with brown bars. It flies low, utters a croaking whistle, and lays ten or eleven buff eggs in isolated tussocks. Both sexes of *Malacorhynchus membranaceus*, the Pink-eyed Duck of Australia and Tasmania (p. 111), are grey-brown with lighter dots, and some white on the face, wing, and tail; the under parts are whiter with brown bands, while behind each blackish eye-patch is a pink mark, situated below a dark line running to the occiput and down the nape. The bill is greenish, and the feet are emerald-coloured or yellowish. This species is a fearless denizen of still waters, with a habit of laying its six rich buff eggs in old Herons' nests, in holes in trees, or on flat branches.

Spatula clypeata, the Shoveller, which now breeds in many parts of Britain, extends from about the Arctic Circle to North Africa, Central Asia, and the United States, wintering southward to Casamance, Somaliland, Ceylon, Borneo, China, Japan, Colombia, and the West Indies, and visiting the Hawaiian islands, the Gilbert Group, and Australia. It is dark brown, relieved by a green head, white neck, chestnut breast and belly; the longer scapulars being black with white median stripes, the wing-coverts pale blue, the speculum green with white anterior border, the bill plumbeous, the feet orange. The female is red-brown with duller wings, while the bill of the young shows the spoon-shaped form in about three weeks. *S. rhynchotis*, of Southern Australia, Tasmania, and the New Zealand area, has a dark brown crown, and blue-grey neck, with a white lateral line, the chest being whitish and the lower parts chestnut, both with black bands; *S. platalea*, ranging from Peru and Paraguay to Patagonia and the Falklands, is reddish with round black spots, having a black crown and rump; whereas *S. capensis*, of South Africa, has a grey-brown head and neck, and brown mantle and under parts with darker mottlings. The wings and scapulars are similar in all the above, except in *S. capensis*, where the latter are dark blue-green. The females hardly differ from each other, but that of *S. rhynchotis* is darker, that of *S. platalea* has a shorter bill, while in both sexes of *S. capensis* the speculum has a blue tinge. Shovellers are somewhat silent birds with a peculiar habit of swimming and feeding in circles over spots where Diving Ducks are submerged[1]; the diet includes herbage, worms, molluscs, crustaceans, and insects; the eggs are pale green.

[1] A. Newton, *Dict. Birds*, 1896, pp. 841-842.

Querquedula circia, the Garganey, which breeds (p. 126) regularly in East Anglia, ranges through most Palaearctic countries, and extends in winter to North Africa, a great part of the Indian Region, and the Moluccas; it has a brown crown, back, and chest, the last-named with darker crescents, a chocolate neck with white flecks, a white streak above the eye, bluish-grey wing-coverts, green speculum with white margins, and long black and white scapulars. *Q. discors*, its North American representative, reaching Ecuador and Peru in the cold season, is redder, with lead-coloured head, a white crescent before the eye, and brighter wing-coverts. The brownish females have a dull speculum. *Q. versicolor*, of America south of Paraguay, and *Q. puna*, of Peru, Bolivia, and Chili, have plumbeous wing-coverts: *Q. cyanoptera*, of western and southern South America, has the head and lower surface chestnut.

The flightless *Nesonetta aucklandica*, of the Auckland group, hardly differs in colour from *Elasmonetta chlorotis*, of the New Zealand area, which is brown waved with black and rufous above, chestnut and reddish with black spots below, the speculum being green and black, the gorget whitish. The female is rufous brown.

Dafila acuta, the Pintail or Sea-Pheasant of the northern regions generally, reaching North Africa, Ceylon, the Sandwich Islands, Panama, and elsewhere in winter, has a brown head and nape, a white line down each side of the neck, grey upper parts vermiculated with dusky, long black scapulars and rectrices mostly edged with white, a purple-green speculum margined in turn with black and white, a cinnamon bar on the wing-coverts, and a white breast. The female is greyish with brown speculum and ochraceous barring above, the markings being oblique on the tail. It now breeds in Scotland. *D. eatoni*, of Kerguelen Island and the Crozets, has a grey breast: *D. spinicauda*, ranging from Peru and South Brazil to Patagonia and the Falklands, has a rufous head and blackish speculum, the sexes being nearly alike, as in the next genus. *Poecilonetta bahamensis* of the Bahamas, Antilles, and South America, *P. galapagensis* of the Galapagos, and *P. erythrorhyncha* of South and East Africa with Madagascar, are somewhat similar birds, having reddish plumage spotted with black, whitish cheeks and throat. In the first two the tail is buff, in the third the bill is chiefly pink, the speculum in all being much as in *Dafila*.

Nettion crecca, the Teal, extending from Britain over most of Europe and temperate Asia, and nesting even in the Azores and

Kuril Islands, winters in North Africa, India, Ceylon, Siam, China, and Japan, and wanders to North America. The head is chestnut with a green eye-patch enclosed by a buffish line, the upper parts are vermiculated with black and white, the speculum is black, green, and purple with a whitish border, the chest is buff with black spots, the under parts are white. *N. carolinense* of North America, which strays to Europe—including Britain, has a white crescent on each side of the breast. *N. formosum* of East Siberia, met with in winter in China, and accidentally in India, Italy, and France, has the head varied with black, green, buff, and white, a bluish wash on the back and chest, a speculum of buff, green, and white. In these three species the female is mottled with brown and rufous, and has a duller speculum. *N. castaneum* of Australia and New Zealand, recorded from Celebes and Java, the doubtful *N. gibberifrons* of the Malay Archipelago, *N. albigulare* of the Andamans, *N. bernieri* of Madagascar, *N. capense* of South and East Africa, *N. flavirostre* of America south of Southern Brazil and Chili, *N. andium* of Ecuador and Venezuela, *N. georgicum* of South Georgia, *N. punctatum* of South and East Africa with Madagascar, *N. brasiliense* of South America generally, and *N. torquatum* of Paraguay, Uruguay, and Argentina, complete the genus. Teal are fresh-water Ducks, feeding chiefly at night on water-plants, seeds, worms, and insects; they are rather silent, and have not the rattling spring-note of the Garganey. The nest is in both cases usually placed at some distance from water in grass, rushes, or heather, the eight to ten eggs being greenish in the Teal and cream-coloured in the Garganey.

Mareca penelope, the Wigeon, which breeds in Scotland, and ranges across North Europe and Asia to Alaska, occurring in winter as far south as Madeira, Abyssinia, Borneo, or even Polynesia, and occasionally on the American coasts, has a rufous head with buff crown, blackish throat and quill-feathers, white upper parts vermiculated with black, white wing-coverts and lower surface, and a green speculum with a black edge. The female is mottled with brown and rufous above, and has a grey-green speculum, and buffish lower parts. This species, which has a whistling cry, whence it is termed "Whew," feeds chiefly by day on grass-wrack and the like when frequenting the mud-flats in winter; the nest is among dry heather or rushes, and contains from seven to ten greenish-buff eggs. *M. americana*, of North

America generally, has a whitish head with black spots, which cover the crown in the female only. *M. sibilatrix*, reaching from Chili and Paraguay to Patagonia and the Falklands, is chiefly black and white with blue-green nape and black speculum.

Chaulelasmus streperus, the Gadwall, which breeds in East Anglia and South Spain, and is apparently spreading thence, occurs in the subarctic regions of both Worlds, and migrates to Shoa, India, China, Mexico, and Jamaica. *C. couesi* of the Fanning group may be distinct. The head and upper neck are light brown with dusky spots; the back is blackish with grey markings, the rump black; the lower parts are white with black crescents on the breast; the wing-coverts grey, chestnut, and black. The female is dark brown varied with rufous. The speculum is white. The habits are as in most fresh-water Ducks, the eggs being buff.

Eunetta falcata of East Asia and Japan is a fine bird with chestnut crown, bronzy-purple cheeks, green occipital crest, white neck ringed with green, grey and black upper parts, and lower surface waved with black and white. The white-margined speculum is green, the long thin sickle-shaped inner secondaries are black and white, and a patch on each side of the tail is buff. Both upper and under tail-coverts exceed the rectrices. The female resembles that of the Gadwall, but has a black speculum.

Anas boscas, the Mallard or Wild Duck, ranges from about the Arctic Circle to the Azores, North Africa, Kashmir, and the United States, being found southward in winter to India and Panama. The head is green with a white collar, the upper parts are grey and brown, the rump is black, the speculum purple with margins of black and white, the breast chestnut, the four curly central rectrices being black. The female is brown and buff with a green speculum. In the habits there is little that is peculiar, but the eggs are greenish. The coloration in the remaining species is usually dusky, nor do the sexes differ greatly. *A. wyvilliana* inhabits the Hawaiian, and *A. laysanensis* the Laysan Islands; *A. melleri* Madagascar; *A. obscura*, with its two local forms *A. fulvigula* and *A. maculosa*, Eastern North America; *A. diazi* and *A. aberti* Mexico; *A. luzonica* the Philippines; *A. superciliosa* the Malay Archipelago and Australian Region; *A. poecilorhyncha*, with red, yellow, and black bill, India, Ceylon, and Burma; *A. zonorhyncha*, where the bill is yellow and black and the feet reddish, Eastern Asia; *A. undulata* and *A. sparsa*, also with yellow and black bill, but

black and orange feet respectively, South and East Africa; *A. specularis*, Chili and Patagonia; and *A. cristata*, with a pendent nuchal crest, America from Peru southwards.

Tadorna cornuta, the Sheld-Drake or Bargander, which ranges from Britain across Europe and temperate Asia to Japan, and migrates to the Mediterranean basin, North India, and South China, has the bill and the basal knob—wanting in the female—red, the feet pink, the head glossy green; it shews a white collar on the lower neck followed by a broad chestnut band; blackish outer scapulars, remiges, and tip of the tail; a patch of chestnut on

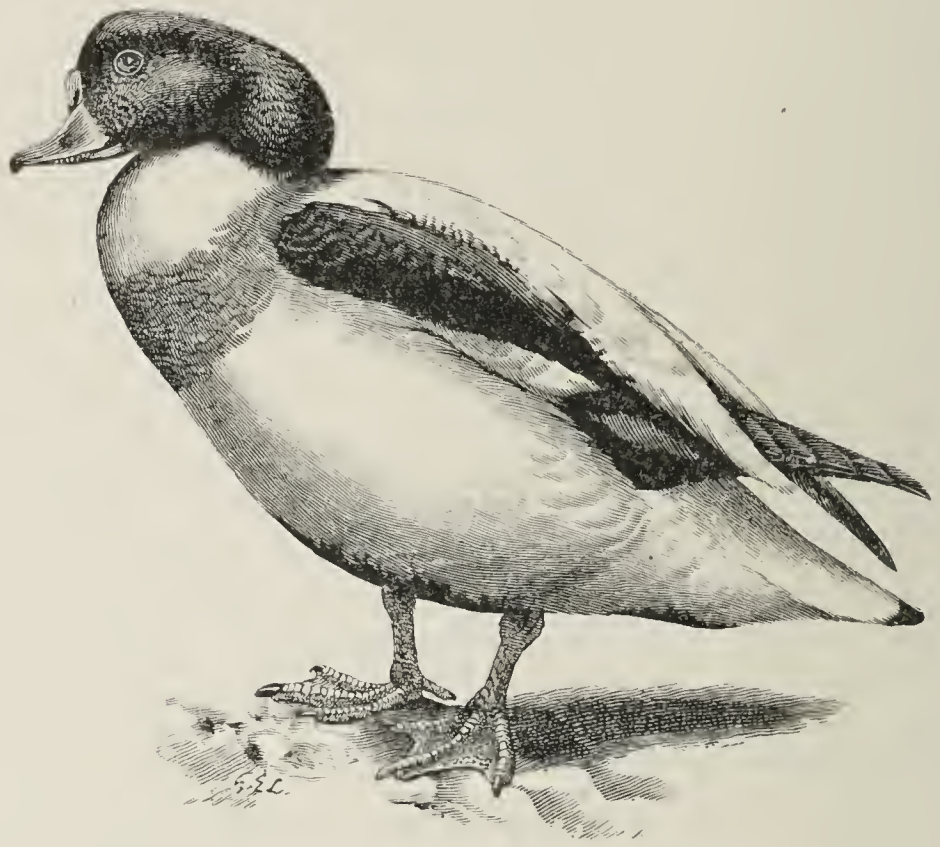

Fig. 34.—Sheld-Drake. *Tadorna cornuta*. $\times \frac{1}{7}$.

the inner secondaries, a green speculum, and a brown line down the under parts, the remaining portions being white. This bird frequents sandy coasts and muddy flats throughout the year, nesting in burrows, or rarely among rocks, masonry, or bushes, and laying some ten shiny white eggs. The flight is powerful and heavy; the note is a shrill whistle or barking quack; the food consists of aquatic plants, molluscs, and insects. *T. radjah*, of Australia, Papuasia, and the Moluccas, is white in both sexes, with blackish scapulars, back, rump, primaries, and rectrices; the mantle is vermiculated with chestnut, the similarly-coloured pectoral band is barred with black, the speculum is green with black posterior margin, the bill and feet are whitish. It breeds commonly in

holes in trees, on which it is quite at ease. *Casarca rutila*, the Ruddy Sheld-Drake or Brahminy Duck of South Europe, North Africa, and temperate Asia, which has strayed to Britain and winters in India, Burma, and Formosa, has a buff head, separated from the orange-brown body by a black collar in summer, white wing-coverts, black wing- and tail-quills, purple and green speculum, and black bill and feet. The female is lighter, with no collar. It frequents fresh water, grazes on corn and grass like a goose, and breeds in holes of any sort. *C. cana* of South Africa differs in its grey head, rufous collar, and black vermiculations above, the female having the front of the head white. *C. variegata* of New Zealand is black relieved by grey, the neck being brown, the anal region and inner secondaries chestnut, the wing-coverts white, the speculum green. The hen-bird has the head white, the lower neck, back, and under parts chestnut, varied with black and white. *C. tadornoïdes*, of South and West Australia and Tasmania, has a glossy green head, white collar, rufous lower neck and chest, black body with fulvous mottlings, white wing-coverts, chestnut inner secondaries, and green speculum, the head of the female being brown.

Chenalopex aegyptiaca, the "Egyptian Goose," found in Palestine and Africa, is rusty or buffish-grey, marked above with black, and with red, white, green, and black on the wing. The nape and collar are rufous; the breast shews a maroon patch, the bill is pink and black, the feet are pink. It has a loud, harsh cry, feeds on land, and lays rather small creamy eggs in cavities of rocks, on trees, or even among rushes. *C. jubata*, of Amazonia and Guiana, is grey, with greenish-black back, wings, and tail, ruddy mantle and belly, purplish-green wing-coverts, and white speculum. The sexes are alike in this genus and the next.

In *Dendrocygna*, containing the Tree-Ducks, which occur mostly in the tropics, the main colour is chestnut or dusky-brown, with dark nape and black rump or belly; but the head may be lighter, the throat or wing-coverts varied with white, or the flanks barred with black and white. *D. viduata*, of the Ethiopian and Neotropical Regions, has the front of the head white; *D. autumnalis*, of Central America, and *D. discolor*, its greyer representative in northern South America, have red bills and whitish feet; *D. arborea*, of the Bahamas and Antilles, has strongly spotted lower parts, as has the larger *D. guttata*, of Mindanao, Celebes, New Guinea, and the Moluccas; *D. fulva*, of the Ethiopian, Neotropical,

and Indian Regions, has white upper and under tail-coverts; *D. javanica*, of the latter area only, has them chestnut above and fulvous white below; *D. arcuata*, ranging from the Malay Archipelago to Fiji, has the breast chestnut barred with black; *D. eytoni*, of Australia, which has strayed to New Zealand, has it yellowish-brown. These birds fly slowly and heavily, and perch regularly on trees, where they sway awkwardly about upon the branches; the note is a clear whistle or a chattering sound; the food consists mainly of fish and water-plants, sought at all times of day. In winter the flocks cause great damage to corn or rice near the lagoons and other waters they frequent. The nest, placed in hollow trees, stumps, long grass, or deserted habitations of other birds, contains from six to twelve white eggs.

Sub-fam. 6. *Chenonettinae.*—*Chenonetta jubata* of Australia has a brown head, long black feathers on the hind-neck, greyish upper parts with black tail, rump, and edges to the scapulars, a green speculum with white borders, a breast mottled with black, grey, and whitish, and a black abdomen. The female is paler, with dull speculum and white belly. It lays its creamy-white eggs in the bush districts in hollow trees, perching even on the tallest of them, and uttering a barking note. *Cyanochen cyanoptera*, of Abyssinia and Shoa, is grey-brown in both sexes, with black wings relieved by lead-blue coverts, and green speculum tipped with white. *Chloëphaga hybrida*, the Kelp Goose of Patagonia and the Falklands, which lives and breeds on the beach, is white, having a black bill with basal yellow spot, and yellow feet. The female is brownish-black with white rump, tail, and anal region, and black lower parts barred with white; the neck shews narrow white bands on its sides, the black and white wing has the greater coverts green, and the bill is flesh-coloured. *C. melanoptera*, of Western America from Peru southwards, is distinguished by brown and white scapulars, black primaries and tail, green and purple wing-coverts, red bill and feet; the female being similar. *C. magellanica*, the Upland Goose, coextensive in range with *C. hybrida*, is white, barred with black above; the rump, four median rectrices, and wings being grey-black, with green and white on the wing-coverts, and white secondaries; the bill and feet are dusky. The female is rufous and black, with similar wings but yellow feet. *C. inornata*, of Chili, Argentina, and Patagonia, differs in having black pectoral bands and a grey head in the female. *C. poliocephala*, of the same

countries, with plumbeous, and *C. rubidiceps*, of the Falklands, with cinnamon head, have in both sexes chestnut and black plumage, the wing being as in *C. magellanica*, the bill black, the feet black and orange. *C. melanoptera* will nest in holes in cliffs.

Sub-fam. 7. *Anserinae*.—In this group the female resembles the male. *Nesochen sandvicensis*, of the Sandwich Islands, has a black head and throat, brown plumage barred with whitish and black, and buff sides of the neck with black stripes. It inhabits craters and "lava-flows" on hills, and is fond of berries. The members of the genus *Bernicla*, or Black Geese, are grey and black, with a varying amount of white, and have black bills and feet. *B. brenta*, the Brent Goose, our commonest winter species, is brownish-black, with darker head, neck, and breast, white tail-coverts and lateral neck-patches. It is found in the Arctic Regions, and migrates as far as the Mediterranean and the Mississippi. It feeds by day in shallows on grass-wrack, laver, crustaceans, and insects, has a loud note, and lays about four cream-coloured eggs. From western Arctic America to the Lena occurs the form *B. nigricans* with white collar and black belly. *B. leucopsis*, the Bernacle Goose, migrating to the same districts as *B. brenta*, abounding on our west coasts in winter, and occupying in summer Arctic Europe and Greenland, where it is supposed to breed, has nested in one place in Norway. The front of the head is white, the crown and neck are black, the mantle is lavender-grey marked with black and white, the under parts are greyish. Unlike the Brent Goose, it feeds at night. *B. canadensis*, of temperate North America, wintering down to Mexico, has a triangular white patch on each side of the black

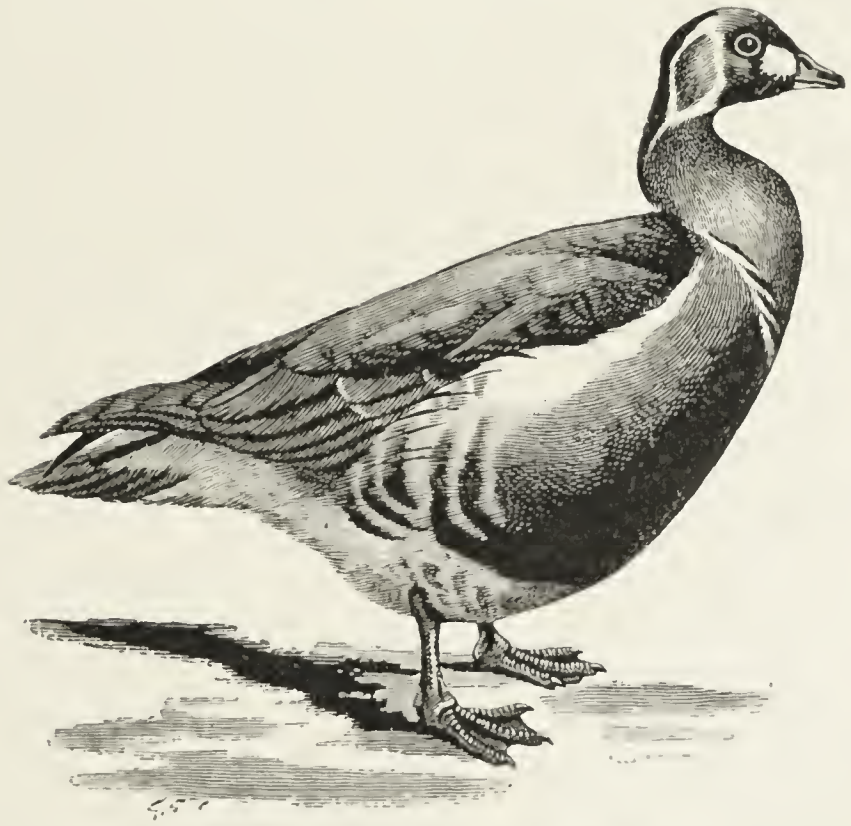

FIG. 35.—Red-breasted Goose. *Bernicla ruficollis*. × $\frac{1}{7}$.

head, and is comparatively large; *B. hutchinsi* is a smaller and more Arctic form, *B. minima* and *B. occidentalis* north-western races of the same. *B. ruficollis*, the Red-breasted Goose of West Siberia, which migrates southwards, strays to Britain, and is portrayed in the paintings of Egypt, is black, with white loral patch, rump, sides and belly, the ear-coverts, fore-neck, and chest are chestnut outlined by white, and the two wing-bands are grey.

Philacte canagica, the Emperor Goose of North-East Asia and North-West America, is blue-grey with black and white bars, the head and nape being white tinted with orange, the throat brownish, the bill purplish-blue with white nail, and the feet orange.

Cygnopsis cygnoïdes, the Chinese Goose of East Asia, is mainly grey-brown above and whitish below, with rufous edges to the feathers; the head and neck are white with a brown band down the crown and nape; the bill is black, or in the domesticated form red with a frontal knob; the feet are orange.

Anser cinereus, the Grey-Lag, which nests in North Scotland and as far south as Spain and Kashgaria, ranges from Iceland to China, the Eastern race being called *A. rubrirostris*; *A. albifrons*, the White-fronted Goose, is found in Britain and most Palaearctic countries in winter, and chiefly eastward of Norway in summer; *A. segetum*, the Bean Goose, another of our hibernal visitants, breeds from Scandinavia to Amurland, and migrates southward to Madeira, North Africa, China, and Japan; *A. brachyrhynchus*, the Pink-footed Goose, extends over North Europe, and is common with us in the cold season: *A. indicus* inhabits Central Asia and North India. *A. middendorffi* (*grandis*) of East Siberia is a large form of the Bean Goose; while the small *A. erythropus*, once shot in Britain, has a similar range to the White-fronted Goose, of which both it and the big *A. gambeli* of North America may be considered sub-species. The general coloration in this genus is grey-brown; in the Grey-Lag the bill and feet are flesh-coloured with white nail, in the White-fronted Goose orange, the latter having a white forehead and white breast with black bars. In the Bean and Pink-footed Geese the nail is black, but the bill and feet are orange-and-black and pink respectively. *A. indicus* is lighter, with brown hind-neck, and two black crescents on the back of the white head. All these "Grey Geese" feed chiefly by day among green corn, stubble, peas, beans or clover, retiring at night to sand-banks or mud-flats in

winter: the note, often syllabled "honk-honk," is at times almost a cackle, whence the flocks or "skeins" are called "gaggles." The nest, placed in herbage or heather, is of grass, moss, twigs, or aquatic plants, and contains five or more whitish eggs.

Chen hyperboreus, the "Wavy," or Snow Goose, of North-East Asia and North-West America, with its larger Eastern American race, *C. nivalis*, and *C. rossi* of Arctic America—which wander south in winter, while the first has occurred in Britain and North Europe—are white, with black primaries, purplish-red bills and feet: *C. rossi* having a warty base to the maxilla. *C. caerulescens*, of eastern North America, is grey-brown, with white head, bluish rump and wing-coverts. The food is of rushes, insects, and berries.

Sub-fam. 8. *Cereopsinae.*—*Cereopsis novae hollandiae*, the Cape Barren Goose of South-East Australia and Tasmania, is grey-brown, with large yellow cere, chiefly reddish-orange feet, black toes and beak. More terrestrial than its nearest kin, it lays similar eggs. The very large extinct *Cnemiornis*, of the superficial deposits of New Zealand, was a close ally, with aborted keel to the sternum and short wings useless for flight.

Sub-fam. 9. *Plectropterinae.*—*Aex sponsa*,[1] the Summer Duck of North America and Cuba, accidental in Jamaica and the Bermudas, has the upper parts mainly glossy green, with purple cheeks, black neck-patches, and white stripes on the face and neck: the breast is chestnut with white spots, the throat and belly are white, the wing-coverts partly blue, the flanks brown, black, and white: the bill is black, white, yellow, purplish, and scarlet; the feet are yellow. It has a long occipital crest. The female is grey-brown with metallic gloss, a white throat and eye-space, plumbeous and black bill, and brownish feet. This inland species feeds on insects, seeds, leaves, and acorns, and lays buff eggs in holes in trees. *Aex galericulata*, the Mandarin Duck of East Asia, is somewhat similar, but has a neck-ruff of narrow chestnut feathers streaked with whitish, a chestnut and black "fan" formed by the decurved innermost secondary, a copper, purple, and green crest, and a red-brown bill. The female is brown, grey, and white.

Nettopus pulchellus, of Australia, New Guinea, and the Moluccas, has the upper parts and neck-collar dark green, the head browner, the remiges and rectrices black with a white wing-bar, the cheeks and lower parts white, the sides marked with

[1] I can hardly agree with Count Salvadori in placing *Aex* here.

green crescentic bands, and the bill and feet black. *N. coromandelianus*, extending from the Indian Region to Celebes, has a white neck, a brown band across the breast, and the flanks freckled with grey; *N. albipennis*, of East Australia, is similar but larger: *N. auritus*, of West and South Africa with Madagascar, has a sea-green patch on each side of the occiput, the lower part of the neck and the flanks being rufous. The females are much duller. These "Pigmy Geese" frequent small lakes and dive admirably; the note is a cackle; the nest, placed in holes in trees or ruins, if not among grass, contains from six to twelve white eggs.

Pteronetta hartlaubi, of West Africa, is chestnut with black head and blue wing-coverts in both sexes. *Rhodonessa caryophyllacea*, of India and Burma, is rich brown dotted with whitish, the head and nape being pink, the speculum salmon-coloured, the bill reddish-white, the feet blackish. It lays round white eggs.

Asarcornis scutulata, ranging from East Bengal to Java, has a black and white head, black mantle and under surface, greenish-olive upper parts, with black and white on the wings, a blue-grey speculum, reddish bill and feet. *Sarkidiornis melanonota*, of India, Ceylon, Burma, and the Ethiopian Region, is black with metallic hues above, and white below; the head and neck are black and white, the rump is grey, the tail brown, the feet, bill, and its basal comb or caruncle black. *S. carunculata*, of Brazil, Paraguay, and North Argentina, differs in its black rump. The comb is largest in the breeding season, and is wanting in females. These Wattle-Ducks perch on trees and breed in cavities of the trunks, laying a dozen or more white eggs. The note is harsh and the flight slow. *Cairina moschata*, the Muscovy—or more correctly Musk—Duck of ornamental waters, extends from Mexico to Argentina; the crested head, neck, and lower parts are brownish-black; the upper surface is glossy green, with purple on the back and white wing-coverts; the bill is black and white; the feet are black; and the frontal and orbital caruncles of the male red. It inhabits forest-swamps, roosts in trees, eats maize, mandioc roots, and herbage, and nests in holes in trees or between forking branches. *Plectropterus gambensis* of Mid-Africa, *P. rüppelli* of the North-East, *P. niger* of the South-East, and *P. scioanus* of Shoa, the four hardly separable Spur-winged Geese, are metallic black, with more or less white on the sides of the head, lesser wing-coverts, throat, and abdomen; the feet, bill, frontal knob,

and caruncles on the forehead when present being red. The female has no knob. They frequent marshes, appear to prefer running to flying or perching, and lay about eight whitish eggs.

Sub-fam. 10. *Anseranatinae*.—This contains only *Anseranas semipalmata* of Australia and Tasmania, a white bird with black head, neck, mantle, wings, and tail, reddish beak, and yellow feet. It haunts swamps, walks easily, and deposits some five white eggs.

Sub-fam. 11. *Cygninae*.—In this group the sexes are similar. *Coscoroba candida*, of southern South America, is white, with black tips to the primaries, pinkish bill and feet. It feeds on land, has a loud trumpeting cry, and a less noisy flight than the true Swans, from which it differs in its feathered lores. *Chenopis atrata*, the Black Swan of Southern Australia and Tasmania, occasionally domesticated in England, is brownish-black, with white remiges, black feet, pink lores, and pink bill banded with white, the scapulars and inner secondaries being curled.

Cygnus musicus, the Whooper, which used to breed in Orkney, and ranges from Iceland through Arctic Europe and Asia, migrating to the Mediterranean, Nepal, China, and Japan, and straying to Greenland, is white with black feet and bill, the basal half of the latter being yellow, while that colour extends still further on the sides. The flight is accompanied by a rushing sound, the note is trumpet-like or whistling, the food consists of aquatic plants, the five or more white eggs are laid upon a pile of herbage near water. The smaller *C. bewicki*, where the yellow on the bill does not reach the nostrils, inhabits the Arctic districts from the White Sea to the Pacific, wandering in winter to Britain, the Mediterranean, South Siberia, China, and Japan. *C. columbianus* of North America, said to have occurred in Scotland, has merely a yellow spot before the eye; *C. buccinator*, of the interior of North America, has a black bill; while *C. olor*, the Mute or Tame Swan, with its variety the Polish Swan, has the fore-part of it orange. *C. olor* ranges from South Sweden and Denmark through Central Europe and Asia, migrating a little southwards. *C. melanocoryphus*, reaching from South Brazil and Chili to Patagonia and the Falklands, has the head and two-thirds of the neck black, with white eye-streak; the bill is plumbeous with red base and knob, the feet are pinkish. The protuberance is wanting in the young, which are marked with rusty, and have the head brown. Of other species immature birds are greyish or dusky, with flesh-coloured

and black beak, except in *C. olor*, where it is plumbeous. In habits Swans are much alike, though the notes differ somewhat, and the Mute Swan merely hisses or croaks in captivity; the latter and the Black Swan are noted for the graceful curve of the neck and their greenish eggs; while the wing-feathers and scapulars are habitually puffed out when on the water. Swans were "Royal Birds" in mediaeval England, and a licence was necessary to keep them, but for this subject and that of the "Swan-marks" on the bill, as well as for accounts of decoys, hybrids, and

FIG. 36. Bewick's Swan. *Cygnus bewicki*. × $\frac{1}{10}$.

domestic races in the Family, the reader must be referred to the works of Professor Newton,[1] Count Salvadori,[2] and other authors.

Fossil remains of this group are found throughout the Miocene of France, Switzerland, Germany, and Italy, referred to *Anser* and *Anas*, with *Chenornis graeuloïdes*; the Pliocene of Oregon has furnished *Branta*, *Cygnus*, and *Anser*, that of Italy *Anas* and *Fuligula*; the Plistocene of Malta *Cygnus* and *Palaeocycnus*, that of Brazil *Chenalopex*. The superficial deposits of New Zealand contain *Cnemiornis*, mentioned above, as well as *Chenopis* and *Biziura*; the Queensland drifts the last-named, and, it is said, *Anas*, *Dendrocycna*, and *Nyroca*; the Mare aux Songes of Mauritius *Anas* and *Sarcidiornis*. *Centrornis majori* is a remarkable form

[1] Cf. *Dict. Birds*, artt. Duck, Goose, Swan, and the references there given.

[2] *Cat. Birds Brit. Mus.* xxvii. 1895.

from Central Madagascar, found at a depth of twelve to fifteen feet with another species *Chenalopex sirabensis*.[1]

Order VII. FALCONIFORMES.

Next to the aquatic Anseriformes may be placed the large and important terrestrial Order Falconiformes, with its Sub-Orders CATHARTAE and ACCIPITRES. The former contains the New-World Vultures (*Cathartidae* or *Sarcorhamphidae*), possessing striking differences of structure from their allies:[2] the latter, the Secretary-Bird (*Serpentariidae*), the Old-World Vultures (*Vulturidae*), the Carrion-Hawks, Hawks, Eagles, Falcons and their kin (*Falconidae*), and the Ospreys (*Pandionidae*). All agree in the strong "raptorial" bill with basal cere, the U-shaped furcula, the large crop, the carnivorous habits, the great powers of flight, the superior size of the female, and the long nest-occupation of the young; but the Cathartae differ in having pervious nostrils, no syringeal muscles, less flattened metatarsi, and so forth.

Fam. I. **Cathartidae.**—These Vultures range from tropical to temperate America, and are often of immense size; the bill is strong, hooked, but blunt; the feet are clumsy with small scales: the scutellated toes, of which the mid-digit is longest and the hallux somewhat elevated, are unfit for grasping: the claws are obtuse and little curved. The ample wings have eleven primaries and from twelve to twenty-five secondaries; the moderate tail is even or rounded, with twelve rectrices, or fourteen in *Pseudogryphus*. The head and long neck are commonly bare, but the latter may be covered with stubbly down, which in *Gyparchus papa* extends to the occiput: the naked skin is often brightly coloured and accompanied by caruncles, while the crop is bare in *Sarcorhamphus* and *Gyparchus*. The eyes are prominent, the cere is horny and sometimes very long, the tongue thick and fleshy, the aftershaft absent. The sexes are alike in plumage, with evenly distributed down, and the nestlings soon develop a white or rufous covering.

Though, generally speaking, predaceous, the members of this Family only attack disabled animals, or often act chiefly as scavengers, whence the smaller forms are commonly found near the abodes of man and even in towns. The larger species sail high above the earth with easy, long-sustained, and majestic flight,

[1] Andrews, *Ibis*, 1897, pp. 344-355. [2] Huxley, *P.Z.S.* 1867, pp. 463-464.

accompanied by little movement of the pinions, as they circle over the plains or mountain-sides in search of prey. In this quest experiments have shewn that they are little guided by smell; rather does some individual, aided by its marvellously keen sight, spy the carrion from afar, its motives being instantly divined by its immediate neighbour; a third bird is next attracted; and so the tidings spread, until a greedy crowd meets to dismember the carcass, to fight over the morsels, and then to sit stupid and gorged, with drooping wings, on or near the ground. Except when feeding, the Cathartidae are non-gregarious, though "Turkey-Buzzards" and "Black Vultures" roost in company; the latter are said to take to the wing with ease, eschewing the preliminary hops of their allies; while all walk well. The voice is a hoarse sound or hiss, owing to the absence of syringeal muscles. The nest of sticks is placed in trees, cavities of rocks, hollow stumps, or on the ground, and may be bulky or of the slightest description; the one or two eggs are white, buff, or greenish, with or without reddish-brown and grey blotches. The parents regurgitate food—at least occasionally—for the nestlings, and eject foul-smelling matter when disturbed.

Sarcorhamphus gryphus, the Condor, only equalled in size among birds that fly by a few Old-World Vultures, and appearing still larger in clear mountain air, ranges down western South America and up to the Rio Negro on the east of Patagonia. The head and neck are bare, with dull red skin, wrinkled in folds on the latter; while an oblique ruff of white down surmounts the black plumage, which shews white edges to the wing-coverts and secondaries. The male has a fleshy crest extending from the mid-cere to the crown, a large wattle on the throat, and a small caruncle below: the irides being in that sex brown, in the female garnet-red. The bill is white with brown base. Smaller and browner examples occur in Ecuador, but larger appendages mark those of Chili and Patagonia. In the southern portion of their range Condors are found down to the sea-level, but Mr. E. Whymper[1] states that in Ecuador they frequent the Andes up to sixteen thousand feet, and rarely descend to the plains. Stupid and voracious, they can be lassoed while feeding, and, though they will attack old horses, calves, lambs, goats, deer, and dogs, especially when dazzled by the sun, they seldom risk an assault on mankind. The nest, of a few sticks, is placed on steep cliffs, and contains two white eggs. A young bird

[1] *Travels amongst the Great Andes of the Equator*, 1891-92, pp. 200-205.

was hatched in London after fifty-four days' incubation, but apparently nearly a year is taken to gain full powers of flight. *Gypagchus papa*, the King Vulture, of tropical America, save the West Indies, has a small fleshy crest on the cere in both sexes, but no wattles, though the skin of the sides of the head is wrinkled; the occiput is hairy, and a ruff of broad plumbeous feathers surrounds the neck. The rump, tail, and most of the

Fig. 37.—Condor. *Sarcorhamphus gryphus* ♀. × $\frac{1}{8}$-$\frac{1}{9}$.

wings are black; the remaining plumage being creamy white, the bare throat and back of the neck yellow, the skin of the head and neck elsewhere orange and red with blue patches near the ears, the bill orange and black, the irides white. This bird haunts woods near rivers and marshes, especially towards the coast, and feeds on snakes and carrion, from which it drives all other species; in flight, habit of gorging, and eggs, it resembles the Condor. Little smaller is the Californian Vulture (*Pseudogryphus californianus*), formerly extending to the Fraser River in British

Columbia, in which the long flat head and neck are bare, smooth, and orange-coloured, the bill being whitish and the irides carmine. The plumage is dull black with a whitish wing-band, due to the margins of the greater coverts and secondaries; lanceolate feathers form a basal ruff round the neck, and extend over the lower parts. The habits are similar to those of the foregoing, but the loose nest of sticks, placed in cavities of trees or crags, contains one rough greenish-white egg. The genus *Rhinogryphus* or *Cathartes* ("Turkey-Buzzard") includes *R. aura*, of temperate and tropical America, reaching to Tierra del Fuego and the Falklands, in which the head and upper neck are naked, smooth, and crimson: and *R. burrovianus*, found from Mexico to Brazil, where they are orange and the nape is feathered; the yellow-headed *R. perniger*, of Amazonia, being hardly separable. All are black with whitish bill, red irides, and a tuft of bristles in front of the eye; but the first has brown-margined feathers and metallic sheen above. In common with *Catharista*, they have the cere very long. During the day-time these quarrelsome scavengers, ubiquitous but necessary, haunt the house-tops and roadways of towns and villages, whence they retire at night to groves or forests in company; otherwise their habits are those of Vultures generally. They have been said to pair for life, while they deposit two whitish eggs with red-brown and lilac markings in some hollow of a crag, tree, or log, often on or near the ground, adding little, if any, bedding. *Catharista atratus*, the "Carrion Crow" or Black Vulture, which ranges from Argentina and Chili to the West Indies and Carolina, and occasionally further north, is most plentiful near the coast; the fearless demeanour, flight, manner of feeding, nesting habits and eggs, resembling those of Turkey-Buzzards, though the wing-action is more laboured, and the gait shuffling. Audubon says that the males strut and gesticulate like Turkeys when courting, while incubation lasts about three weeks. The colour is black, the naked head being dusky and the upper neck somewhat corrugated; the bill is blackish with light tip, the irides are brown.

Fossils referred to this Family are met with in North and South America.[1]

The points wherein the Cathartae differ from the Accipitres

[1] *Check-List N. Amer. Birds*, 1895. p. 344; Moreno and Mercerat, *An. Mus. La Plata. Pal. Argent.* i. 1891, pp. 67-69, pls. xviii.-xx. See also *Dryornis* (p. 44 *supra*).

having been already noticed (p. 137), it only remains to discuss in detail the several families comprised in the latter Sub-Order.

Fam. II. **Serpentariidae.**—This contains only *Serpentarius secretarius*, the African Secretary-Bird—now generally recognised as an Accipitrine form—which is most common in the south,

FIG. 38.—Secretary-Bird. *Serpentarius secretarius.* × $\frac{1}{9}$.

though extending northwards to the Gambia, Khartum, and Abyssinia. It was first accurately made known in 1769, from an example living in the menagerie of the Prince of Orange, by Vosmaer, who was told that at the Cape of Good Hope it was called "Sagittarius," or Archer, from its habit of striding like a bowman about to shoot, and that this name had been corrupted into "Secretarius." Subsequently—about 1770—a pair was

brought alive to England.[1] The appellation is evidently, however, derived from the nuchal tuft, which bears a fancied resemblance to the pen of a clerk stuck above his ear. Standing some four feet high on very long legs, this bird gives the impression of a Heron or Crane, and is a striking object on its native plains. The short strong beak is greatly arched, and is not toothed, the neck is elongated, the body comparatively small, and the metatarsus boldly scutellated all round, the short straight toes with their blunt claws being joined anteriorly by small membranes. The ample wings have eleven pointed primaries and seventeen secondaries; the graduated tail of twelve rectrices has the two obtuse median feathers drooping and much prolonged. Down is evenly distributed over the adults, and an aftershaft is present. The general colour is bluish-grey, with black wing-quills, lower back and vent; the loose pendent crest on the occiput and nape contains ten plumes in pairs, the longer being black and the shorter grey with black ends; the tail is grey, subterminally barred with black and tipped with white, which sometimes shews on the short close flank-feathers. The long cere, naked sides of the face, and feet are yellow, the irides hazel. The sexes are similar.

In South Africa these useful birds—favoured by a protecting law—are often brought up tame about the homesteads, where they kill reptiles and keep off feathered intruders, though they occasionally tax the poultry-yard themselves; the food consists of small mammals, birds, lizards, and tortoises, but above all of snakes and insects. When the Secretary attacks a reptile, it advances on foot and delivers a forward kick with its powerful leg, striking simultaneously with the knobbed wings, which shield its body; then it retreats with a bound, as the hissing snake makes a vicious lunge; but soon, watching its opportunity, breaks through its opponent's guard and stands triumphant with crest erect, before swallowing the disabled foe.[2] If, however, the snake touches the bird's flesh, the result is reversed; and so well, according to Mr. Atmore,[3] does the latter know this, that it plucks out instantly any feather that the fangs have reached. Possibly reptiles are occasionally killed by being carried aloft and dropped. Usually seen stalking easily along, this graceful species can almost out-pace a

[1] Cf. A. Newton, *Dict. Birds*, 1894, pp. 822, 823

[2] This is abbreviated from the account by J. Verreaux, *P.Z.S.* 1856, pp. 348-352.

[3] Layard, ed. Sharpe, *Birds of South Africa*, 1875-1884, p. 9.

horseman, while it will fly when hard pressed, or soar to a considerable height. The huge nest, occupied from year to year, is placed in a bush or tree, and is composed of sticks and clay with a lining of wool and hair, the two or three eggs being white with rusty markings. In six weeks the downy white young are hatched, which remain some four months in the nest, often uttering a harsh cry. The legs of both nestlings and adults are very fragile, and snap if they trip while running.

A fossil form (*S. robustus*) has been recorded from the Lower Miocene of Allier in France.

Fam. III. **Vulturidae.**—The Old-World Vultures have a strong hooked bill—exceptionally slender in *Neophron*—which may be sinuate, but has no tooth. They possess a horny cere; a comparatively short, stout, reticulated metatarsus, often partly feathered; scutellated toes on a level, with bluntish slightly curved claws, and a short membrane between the outer and mid digits. They lack the bony ridge found over the eye in the Falconidae. The somewhat pointed wings are long and broad, with eleven primaries and from seventeen to twenty-five secondaries: the moderate tail, ordinarily of twelve feathers, is rounded, but varies to wedge-shaped in *Neophron*, where, as in *Gyps*, there are fourteen rectrices. The plumage is compact: the crop prominent; the head and neck are bare or sparsely-haired in *Otogyps* and *Pseudogyps*, more or less downy in *Vultur*, *Lophogyps*, and *Gyps*, and partly feathered in *Neophron;* while a ruff of down or plumes covers the shoulders. The nostrils are circular in *Vultur*, horizontally elongated in *Neophron*, oval and vertical elsewhere; the fleshy tongue may show bristly or upcurved margins, and the syrinx has two pairs of tracheo-bronchial muscles. Uniformly distributed down and an aftershaft characterize the adults, while the white woolly nestling of *Gyps* is said to be hatched naked.[1] Except as regards *Neophron*, the habits resemble those of the Cathartidae, the carrion diet producing a most offensive odour. The plumage of the sexes is the same.

Vultur monachus (*cinereus*), the Black Vulture, has its headquarters in the Mediterranean Region, whence it extends to the Gold Coast, Nubia, the Lower Danube, North India and China, and has strayed to Denmark. Not unlike the more sociable Griffon Vulture in general habits, it shows a preference for wooded country,

[1] Chapman and Buck, *Wild Spain*, 1893, p. 207.

constructing a bulky shallow nest of sticks, grass, and wool almost invariably on trees, and laying one, or rarely two, white eggs blotched with dark red. The plumage is brownish-black, with a ruff of lanceolate feathers below the bare neck, and black down on the crown and throat. The naked skin and cere are of a livid flesh-colour, the feet yellowish; the bill is black, the iris brown. *Lophogyps occipitalis*, of East and South Africa and Senegal, is dark brown with blacker remiges and rectrices, and some white on the wings; the reddish head and neck are bare, except for white down on the crown, which thickens towards the occiput; the ruff is brown, the abdomen and crop are white, the feet pinkish; the bill is orange with bluish cere, the iris brown. *Otogyps auricularis*, of North-East and South Africa, called the "Eared Vulture" from the fleshy lappets (of the same pinkish colour as the naked head, cere, and feet) on the sides of the neck, is brown, with blackish wings and tail, varied by white down on the thighs and chest; a brown ruff covers the hind-neck, while the bill and irides are yellow. *O. calvus*, the smaller Pondicherry- or King-Vulture of India, Burma, and Siam, is black. These birds usually hunt in pairs, driving all intruders except Eagles from their prey: they construct immense stick nests, often used in successive years, on thick bushes or trees; straw, leaves, and the like being added for lining, and one white egg, often with red-brown markings, deposited. *Gyps fulvus*, the Griffon Vulture, which has occurred in Germany, Poland, and once in Britain, breeds from the Spanish Pyrenees through Southern Europe and Northern Africa, reaching lat. 50° N. in Russia, and extending eastward to North India, by way of Turkestan, where it overlaps the larger form *G. himalayensis*. It is fawn-brown above and streaky buff below, with nearly black wings and tail, the adults having a downy white ruff, represented in the young by a brown collar; the head is thinly covered with white hairs, the beak is horn-coloured with blue-black cere, the feet are plumbeous, the irides orange. This active though cowardly species is often seen basking on rocks at mid-day: it flies or hovers with easy movements, and can soar until it almost disappears in the sky. It has a growling note. The nest, a mass of sticks and grass of variable size, is placed on cliffs, and contains one or even two white eggs, sometimes with rusty markings. Incubation lasts forty days, the young remaining three months in the nest. *G. kolbi* of South Africa is much paler; *G. rüppelli*, of the north-east and south of

that continent, has a yellower head and browner back; *G. indicus* of India and the Indo-Malay mainland, from which *G. pallescens* is hardly separable, has a barer head and comparatively thin bill: the former breeds in trees in place of rocks. *Pseudogyps bengalensis*, the White-backed Vulture, ranging through India and down the Malay Peninsula, is black above, but brownish below, with the thin downy ruff and lower back white; the bill is greyish, the cere, feet, naked head and neck are black, the irides brown. This bird snorts, hisses, or even roars, and walks easily, though awkwardly. It nests in company on trees, and often lines the large stick-fabric with foliage, as do so many other Raptorial forms; the greenish-white eggs, seldom marked with red, vary much in bulk. *P. africanus*, of North-East and West Africa, is decidedly browner.

The genus *Neophron* contains the smallest Vultures, *N. percnopterus* being called, from its frequent occurrence on Egyptian hieroglyphs, the Egyptian Vulture or Pharaoh's Hen. It has wandered thrice to Britain and also to North Europe, while it breeds from Savoy and Provence to Madeira, the Canaries, the Capé Verds, North Africa, and India, meeting in the last-named the smaller *N. ginginianus*; in winter it visits South Africa, where it is called the "White Crow." The plumage is white, with black primaries and partially brown secondaries; a ruff of lanceolate feathers extends up to the occiput, the naked head and neck are yellow, the tip of the bill alone being black; the feet are pink, the irides crimson. Often seen striding sedately along in search of animal and vegetable refuse or dung, this species also follows the plough and devours worms, grubs, insects, reptiles, and frogs; while from its alleged habit of breaking bones left by other Vultures, it is called "Quebranta-huesos" or "bone-smasher" by the Spaniards.[1] The flight is slow and easy, the voice a croak. The flat nest of sticks, lined with soft materials, and especially rags, is placed on a crag or tree, and contains two white eggs with red-brown or claret blotches. *N. pileatus* of South Africa—which has a larger north-eastern and western form—is brown, with black wings and tail, downy whitish nape, purplish naked areas, dusky bill and feet, and brown irides.

Of fossil forms there are recorded *Gyps melitensis*[2] from the Plistocene of Malta. and *Vultur* from that of France.[3]

[1] Chapman and Buck, *Wild Spain*, 1893, p. 206. The Black Vulture, however, may possibly be meant, as the Egyptian Vulture does not seem to break bones.
[2] Lydekker, *P.Z.S.* 1890, p. 404. [3] Id. *Cat. Fossil Birds Brit. Mus.* 1891, p. 29.

Fam. IV. **Falconidae.**—This group may be divided into the Sub-families (1) *Gypaëtinae* for the Lämmergeiers; (2) *Polyborinae* for the "Carrion Hawks"; (3) *Accipitrinae* for the Hawks, with *Circus, Polyboroïdes,* and so forth; (4) *Aquilinae* for the Eagles; (5) *Buteoninae* for the Buzzards and Kites; and (6) *Falconinae* for the Falcons.

Though the skull is small in *Circus* and some other forms, it is usually large and broad, being considerably elongated in the Aquilinae. The short stout bill is strongly curved, and terminates in a hook, which is often nearly perpendicular, and is specially prominent in *Rostrhamus, Leptodon, Harpyhaliaëtus, Pithecophaga* and *Thrasaëtus;* the basal third is straight in Eagles, while the edges of the maxilla are lobed or festooned to a variable extent, and in the Falconinae are distinctly toothed, or even bidentate in the case of *Spiziapteryx, Harpagus,* and *Baza.* A bony ridge over the eye conduces to the fierce aspect, especially in the larger species. The feet are robust and well-fitted for grasping, and are enormously developed in *Thrasaëtus;* the metatarsus is much flattened, and may be scutellated or reticulated, though the scales are usually smaller behind; the tibia generally exceeds it in measurement, but in Accipitrine forms is nearly equal, giving them a long-legged appearance. Elongated bare metatarsi are characteristic of *Circus, Polyboroïdes,* and the Polyborinae. The claws are sharp and curved, especially in *Rostrhamus;* a short membrane connects the middle and outer toes, and the inner also in the Polyborinae; while their under surface is more or less padded, and exhibits rugose spicules below in *Busarellus,* similar to those in *Pandion.* The powerful wings may be long and pointed, as in the Kites, Falcons, and Harriers; moderate and somewhat rounded, as in the Eagles and Buzzards; or short and narrow, as in Hawks. Falconers term the long-winged forms "noble," the short-winged "ignoble." The tail, usually of medium size, but sometimes very short, as in *Helotarsus* and *Gypohierax,* is decidedly elongated in the Accipitrinae and *Polyborus,* and also in *Milvus, Lophoictinia, Elanoïdes,* and *Nauclerus,* where it is forked—very deeply in the two last: it may be wedge-shaped, as in *Uroaëtus, Thalassaëtus, Harpyhaliaëtus,* and *Gypaëtus;* rounded, as in *Elanus* and *Haliaëtus;* nearly even, as in *Buteo* and *Aquila;* or emarginated, as in *Ictinia* and *Rostrhamus.* Normally there are twelve rectrices, but *Thalassaëtus* has fourteen. The colour varies greatly with age,

and it often takes four years or more to attain maturity, the markings commonly changing from longitudinal to transverse; but the sexes are usually alike, though the Kestrel, Merlin, Red-footed Falcon, and many Harriers are well-known exceptions, the last having generally blue-grey males and brown females. The occipital feathers are elongated in several of the Polyborinae, and a full crest occurs in many genera, *Lophoaëtus*, *Thrasaëtus*, *Harpyhaliaëtus*, *Helotarsus*, *Morphnus*, and *Lophoictinia* being especially noticeable; *Circus* has a facial ruff, coupled with exceptionally large aural apertures; the feathers of the neck may be lanceolate, as in *Haliaëtus*, or those of the nape, as in *Aquila*; and the plumage commonly over-hangs the metatarsus, which is feathered to the toes in various Aquiline forms, and in *Archibuteo*. The nostrils are circular in the Falconinae, oval or nearly linear elsewhere, with a central tubercle in the last-named and the Polyborinae, seldom found in the other Sub-families: they are generally in or near the cere, which is almost always fleshy. An aftershaft is present; the down in adults is uniform; that of the nestling being woolly and varying from white to grey, buff, brown, or black. The feet are yellow, red, or brown; the bill is ordinarily dark, and the cere yellow; *Gypaëtus*, however, has all these parts bluish-grey, with a crimson sclerotic membrane (equivalent to the "white of the eye") round the orange iris, the latter being yellow or orange in the Accipitrinae, brown in the Falconinae, and varying to red elsewhere. The syrinx has two pairs of tracheo-bronchial muscles; the tongue is thick and often concave; and Nitzsch [1] has recorded single or paired powder-down patches on the lower back of *Elanoïdes*, *Elanus*, *Regerhinus*, and *Circus*, with similar but scattered down-feathers in *Gypaëtus*.

The members of this Family range in size from the mighty Lämmergeier to the tiny Finch-Falcon (*Microhierax*); but they have many habits in common, though *Polyborus* and *Milvago* are somewhat terrestrial and vulturine, and a few species have crepuscular tendencies. They are decidedly non-gregarious, though the Polyborinae, *Erythropus*, and *Rostrhamus* form partial exceptions; they pair very early in the year, if not for life, the larger forms in especial breeding almost before winter is over. Birds of the mountains, the plains, and the woods, they can bear the cold of the icy regions or the heat of the Equator, but towards

[1] *Pterylography* (*Ray Soc.*) ed. Sclater, 1867, p. 37.

either pole the number of species decreases perceptibly. The sight is exceptionally keen, and the flight generally powerful and rapid; Eagles and Buzzards indeed move heavily to all appearance, as they circle or sail around with flapping action, but the spectacle of the former in chase of a grouse will quickly disillusion the observer. Kites are still more versatile upon the wing, nor are the Polyborine forms always deficient in this respect, while the dash and speed of Hawks and Falcons in their different styles is proverbial.[1] Harriers and the like may be seen buoyantly quartering the ground for hours, poising themselves almost motionless aloft, or gliding in circles to great heights; and the hovering or stationary position on the wing, which gives the name of "Windhover" to the Kestrel, is more general than might be supposed throughout the Family. Taken as a class, few birds can fly so well or so untiringly, though Vultures, Cranes, Storks, Albatroses, and the larger Gulls have even greater powers of endurance; they can, moreover, perch with great facility, and, while seldom running or walking fast, can move with freedom upon the ground, where they generally progress by means of hops, and aid themselves with their wings. Many of the Falconidae are very quarrelsome, and use their talons as weapons of offence, this trait being emphasized at the nesting-quarters, whence feathered intruders are rigorously excluded. The cry is shrill, but varies in depth; in the Peregrine Falcon it is a succession of short notes, in Eagles it resembles a yelp, in Buzzards a cat's mew, in Kites a whistle, and so forth; whereas in *Melierax* it may almost be called a song. The diet varies considerably, and consists of mammals, birds, reptiles, fish, frogs, tortoises, crabs, molluscs, and insects. *Gypohierax*, *Aquila*, *Haliastur*, *Milvago*, and *Polyborus* certainly eat carrion, and the last will attack newly-born lambs—a grievance made the most of by sheep-farmers in the case of Eagles; while the larger forms kill fawns, monkeys, foxes, hares, and other creatures of considerable size. Buzzards keep down rabbits, and hunt rats and mice as assiduously as Harriers and the Kestrel; the latter devours quantities of insects, as do also some of the Polyborinae; and the so-called "Honey" Buzzard (*Pernis*) gains its name from its fondness for grubs of bees or wasps. Kites work havoc among poultry; the Golden Eagle, and still more the Peregrine Falcon, among moor-fowl; the last two proving an

[1] Falconry is too large a subject to be considered here; but the reader may be referred to the works of Salvin and Brodrick, Freeman and Salvin, and others.

advantage in Scotch deer-forests, where the noisy grouse disturb the stags, but being in peril of extermination on the moorlands; yet it is questionable whether more good than harm is not done by the destruction of weakly game. The Osprey and Sea-Eagle eat little but fish, though they are not alone in that habit, while *Rostrhamus* lives almost entirely on fresh-water molluscs. Most members of the Family do not alight to capture their prey, but seize it with their sharp talons either sitting or on the wing, the chief exceptions being the carrion- and insect-eaters; it is often conveyed to some favourite spot of ground or rock to devour, smaller objects being transported in the bill and the bigger torn to pieces and stripped before being swallowed. Large bones may be broken up, slender bones bolted entire; but hard substances are always ejected subsequently as pellets, after the manner of Owls (p. 401), the nature of the diet being readily detected from these castings. Exceptionally curious habits are credited to *Gypaëtus* and *Gypoictinia*, as will be seen below. After a meal, quiescence is the rule, but none of the tribe gorge like Vultures. The predilections of species or even of individuals determine the situation of the nest, Eagles and other large forms preferring rocks in mountain-glens, lofty cliffs, or trees, for their bulky fabric of sticks, heather, and the like, which is lined with softer substances, and often bedded with foliage. The larger Falcons frequently select ledges on sea-girt or inland crags, and merely scrape a hole in the soil; but they, in common with the lesser Falcons, also utilize deserted habitations of Crows and so forth, or even lay their eggs on level ground or upon crumbling masonry; while the American "Sparrow-Hawk" (*Tinnunculus sparverius*) commonly appropriates old holes of Woodpeckers. Harriers, *Rostrhamus*, and other forms choose sites in reed-beds, gorse-coverts, fern, rough grass, or corn, and eschew hard materials: Hawks usually construct a flat platform of branches lined with thinner twigs. The eggs are generally bluish-, greenish-, or yellowish-white, with fine blotches, streaks, and spots of red, brown, or claret, chiefly towards the larger end: but in Falcons they are more or less covered with ruddy or orange markings, which often obliterate the ground-colour. Unspotted specimens are not uncommon, and in the case of Harriers we have an instance of a plain bluish coloration, a few rusty stains being exceptionally visible. Alternative sites are frequently tenanted, or former nests repaired. Incubation is often of con-

siderable duration, and the young remain long in the nest—four months, it is said, in the Lämmergeier; the longevity, too, of Eagles is notorious, a span of a hundred years having been actually recorded. Unconscious mimicry is shewn by *Accipiter pilcatus*, which assumes the garb of *Harpagus diodon* near Rio Janeiro.

Sub-fam. 1. *Gypaëtinae*.—This group apparently links the

FIG. 39.—Lämmergeier. *Gypaëtus barbatus*. $\times \frac{1}{8}$-$\frac{1}{9}$.

Vulturidae to the Falconidae, but seems nearer to the latter. *Gypaëtus barbatus*, the magnificent Lämmergeier, is greyish-black with white streaks, and has a white crown, cheeks with a black band bifurcating at the eye to meet above, and pale tawny lanceolate plumage on the neck and lower parts. Dense black bristles cover the nostrils and lores, and a black tuft, which gives the name of "Bearded Vulture," projects below the mandible. The sclerotic

membrane is crimson (p. 147). The young are chiefly brown and buff. From Portugal and Mauritania this species extends through the lofty mountains of South Europe to the Himalayas and North China, though practically exterminated in Switzerland and Carinthia; *G. ossifragus* (*meridionalis*), with no black stripe below the eye, represents it in North-Eastern and Southern Africa. Avoiding its own kin, the Lämmergeier often breeds near Griffon Vultures; the large nest of sticks, lined with wool and hair, begun very early in the year, being placed in some cavity of a cliff or on a precipitous ledge, and containing one egg—or rarely two—which appear pale orange owing to the confluent markings. The flight is majestic and powerful; the cry weak and querulous, with a croak when irritated. In parts of Spain and India, natives assert that this bird preys only on carcases; but in Macedonia it is said to carry off lambs, kids, and fowls, and no doubt occasionally it kills small mammals and birds, though all statements should be carefully criticised, as it usurps the name of "Grifo" or Griffon in Spain, and that of Golden Eagle in India; while conversely any Eagle is pointed out in the Alps as a Lämmergeier. It has been credited with a habit of scaring young animals over the cliffs by descending with a sudden rush, but its nature is cowardly, and it does not seem to attack man; yet marvellous tales have been told of its strength and daring, some of which may in part be true, though the evidence is hardly convincing. Like *Neophron*, it is said to carry bones up into the air, letting them fall to break them, while land-tortoises are similarly treated in North Africa, and possibly this species is responsible for the death of the poet Æschylus, on whose bare head a tortoise is alleged to have been dropped.[1] *Gypohierax angolensis*, somewhat approaching the Vulturidae, is white, with the secondaries, most of the scapulars, the tips of the primaries, and the base of the tail black: the bare skin of the sides of the face and the feet are flesh-coloured, and the beak is grey-blue. Rare in East and South Africa, though common in the West, it is generally seen on lagoons, rivers, or sea-shores, sunning itself on some elevation, or skimming the water with laboured flight in search of fish. It will attack animals and eat garbage.

Sub-fam. 2. *Polyborinae*.—Of the American "Carrion Hawks," *Polyborus tharus* is dull black, with whitish neck, back, breast,

[1] Salvin, *Ibis*, 1859. p. 177; Pliny, *Hist. Nat.* lib. x. cap. 3.

and tail, more or less barred with dusky, and broad blackish tips to the rectrices. The bare red skin of the cheeks and throat imparts a vulturine look, belied, however, by the almost gallinaceous feet. It inhabits South America from Ecuador and Guiana southwards; but thence the very similar *P. cheriway* ranges to Florida and Lower California, *P. lutosus* occurring in Guadelupe Island off the latter. The Carancho or Cáracara, as *P. tharus* is called, resembles in habits the "Turkey-Buzzards" (*Rhinogryphus*), with which it consorts, though somewhat shy and quarrelsome. Semi-gregarious, and audacious if unmolested, it passes the hot hours in the shade, and roosts in company at night; while the powerful and graceful flight, with its alternate sailing or flapping movements, though not rapid, enables it to soar in spirals to a great altitude. It walks or runs with ease. The far-reaching grating note is usually uttered with the head thrown back; the food of refuse and carrion is supplemented by young lambs or alligators, birds, frogs, reptiles, land-crabs, worms, and insects. When on a tree, bush, or cliff, the large shallow nest, often renewed yearly, is made of sticks and lined with grass, leaves, roots, wool, or scraps of any sort; but, when on the ground or in swamps, reeds and herbage are commonly utilized. The three or four eggs range from white with red blotches to cinnamon with a few black marks.

Ibycter, *Phalcobaenus*, and *Senex* are kindred Neotropical genera of a greenish-black colour, with a variable amount of white on the tail, lower parts, and even the wings and nape; the cheeks and throat are naked and red in the first, and orange in the second, while the cheeks only are yellow in the third. *Phalcobaenus* has a slight crest, *P. carunculatus* a fleshy orange caruncle at the base of the bill, *Senex* rufous thighs. *Ibycter ater* occurs in Amazonia, *I. americanus* from Guatemala and Honduras to Brazil, *Phalcobaenus megalopterus* from Chili to West Peru, *P. carunculatus* in Ecuador and New Granada, *P. albigularis* in Patagonia, while *Senex australis* is the "Johnny Rook" of the Falklands. Close allies are *Milvago chimachima* and *M. chimango*, ranging from Panama to Paraguay, and from about lat. 20° S. to Tierra del Fuego respectively; the former is brown, with creamy head, neck, tail, and under-parts, and rectrices barred with brown; the latter has the head rufous and black, the lower surface streaky-looking yellowish-brown, the tail greyer. The lores and naked orbits are pinkish.

These forms are similar in manners to *Polyborus*, but *Milvago* is

more terrestrial, and chiefly frequents grassy plains; it is moreover less energetic, and has an easy and loitering though protracted flight, with a custom of uttering its whistling or mournful notes in chorus, the head being thrown back as in the Caracho. The nest of sticks, lined with grass, hair, and wool, may be on trees, in grass, or rushes, *Senex* preferring sea-girt cliffs; the eggs, from two to five in number, are cream-coloured, or reddish with darker markings, and vary as in *Polyborus*. Human beings are very rarely molested by "Carrion Hawks," though birds seem to fear them greatly.

Sub-fam. 3. *Accipitrinae*.—First of this group may be placed six genera of "Harrier-Eagles," classed as Circaëtinae by the late J. H. Gurney,[1] of which *Herpetotheres cachinnans*, ranging from South Mexico to Bolivia and Paraguay, is the only American representative. It is a crested bird, of a brown colour above, relieved by creamy buff, which extends over the whole under surface, the nape and face being mostly black. It eats snakes, and sits aloft bobbing its head while uttering a gruff "ha-ha." Of the African genus *Circaëtus* one species, *C. gallicus*—Jean-le-blanc of the French—extends from Southern and Central Europe to Palestine, India, North China, Timor, and Flores. It is dark brown above, and white with blackish-brown streaks and bars below, the secondaries and tail having white tips, and the latter three dusky cross-bands. This sluggish but bold denizen of the plains may be seen perched on trees, quartering the ground with heavy flapping flight, or anon poising itself aloft on motionless wings, the harsh noisy cry being varied by a twittering note. Snakes form its favourite food, while frogs and fish from the shallows, small mammals, birds, lizards, crabs, and insects add to its daily fare. The bulky nest of sticks, bedded with grass or green leaves, is situated on trees, bushes, or even rocky ledges; a single bluish-white egg—or exceptionally two—being deposited. The female sits very closely, and both parents sometimes attack intruders. *C. cinereus*, of most of the Ethiopian Region, has the chest brownish-black and the belly white; *C. fasciolatus* of Natal, and the similar *C. beaudouini* of Senegal and North-East Africa, have the former part fulvous-brown, and the latter barred with dusky: *C. cinerascens* of the east and west of that continent is much greyer below, with narrower bars. *Helotarsus ecaudatus* of the whole Ethiopian Region is black, with maroon back and tail, and a broad grey band across the second-

[1] *A list of the Diurnal Birds of Prey*, 1884, pp. 14-18.

aries; the wide crest, short rectrices, red cere, lores and feet, rendering it most remarkable. *H. leuconotus* is hardly more than a creamy-backed variety. It sails aloft in powerful style, and dashes like lightning upon the snakes, mammals, and lizards, which form its prey; the nest of sticks is placed in trees or rocks, and contains, it is said, from two to four white eggs. The crested *Eutriorchis* of Madagascar, and *Dryotriorchis* of the Gold Coast, short of wing but long of tail, should probably be placed here. A fine broad crest also adorns *Spilornis*, of which genus some seven members occur in the Indian Region, and the Celebes group. *S. undulatus* (*cheela*), extending from India to China, has the head black and white, the remaining plumage brown, with whitish markings above, round white spots below, and a broad light band across the white-tipped tail. *S. sulaënsis* of the Sula Islands differs in being barred beneath; *S. holospilus* of the Philippines has the whole body spotted. These arboreal forms live upon snakes, frogs, insects, and birds, the last of which they hunt in pairs, converging gradually on the victim from each side: the note is mournful; the small nest of twigs, lined with grass or leaves, is placed in trees; the two eggs are rufous or white with red markings.

The slender *Polyboroïdes typicus*, of most of the Ethiopian Region, combines the appearance of a Harrier with that of a typical Hawk; it is grey with white tips to the black remiges and rectrices, and shews black and white bars on the lower breast and abdomen. A whitish band crosses the tail, while the naked cheeks and cere are yellow. *P. radiatus* of Madagascar is more silvery. Resembling the following group in habits, these birds prefer grass-lands, especially when newly burnt, take comparatively short flights, and rest more frequently on trees or stumps. They are said to be able to bend the tibio-tarsal joint either way.

Circus, ranging over nearly the whole world, comprises some seventeen species, in most of which the sexes differ in coloration —an unusual fact in Raptorial forms. They are graceful and soft-plumaged, with long legs, wings, and tail, the partial facial ruff creating a likeness—superficial and not warranted by structure —to the owls. Non-arboreal and by nature shy, they may be seen hovering or circling aloft, or systematically beating over the flats with buoyant untiring flight, the pinions flapping slowly and regularly, and exposing a broad surface to the air. They can, however, move with rapidity, and approach their breeding-quarters

with a fine downward sweep, an exceptionally bold cock sometimes almost striking an intruder. The cry, chiefly heard during incubation, is shrill: the food consists mainly of small mammals, but partially of birds, reptiles, fish, frogs, insects, or even eggs; the nest, placed among reeds, corn or herbage, in gorse-coverts or on heathery or grassy slopes, is, according to circumstances, a pile or layer of the surrounding vegetation lined with the finer portions, and contains from three to six bluish-white eggs, rarely blotched with rufous. Nesting-sites in trees are on record. Three species still breed in Britain, *C. cyaneus*, the Hen Harrier, *C. cineraceus*, Montagu's Harrier, and *C. aeruginosus*, the Marsh Harrier or "Moor Buzzard." The first two are much alike and easily confounded, the female in both being brown above and buffish with dark streaks below, while the tail is crossed by five umber bars. The male, which is bluish-grey with white rump and abdomen in the Hen Harrier, but is streaked beneath with rufous in the more slender Montagu's Harrier, is commonly considered a different species from the female by rustics, who call it the "Kite." These forms range over Europe, Asia, and North Africa; but whereas the first-named reaches about lat. 69° N. in summer, and occurs from Morocco and Abyssinia to Canton in winter, its congener is not found so far north, and migrates down to Cape Colony, Ceylon, and Burma. *C. aeruginosus*, now nearly exterminated in Britain, extends from South Scandinavia and Archangel to Japan, and to the Transvaal and Ceylon in the cold season. The upper parts are brown with blackish primaries, the remainder of the wings and the tail being grey; the lower surface is buff with brownish stripes. Old males have the head nearly cream-coloured, while the irides in the female are rather hazel than yellow. The North American *C. hudsonius* is very near *C. cyaneus*; South America possesses *C. cinereus*, and, on the east, *C. maculosus*; *C. swainsoni* reaches from South-East Europe to India and China, with Africa in winter; *C. ranivorus* and *C. maurus* occupy South Africa; *C. spilonotus* and *C. melanoleucus* East Asia, the latter being coloured black, white, and grey; *C. assimilis* (*jardinii*)—marked with chestnut above, and spotted with white below—inhabits Australia and Tasmania: *C. gouldi* (*approximans*) the same countries, New Zealand, and Fiji: *C. wolfi* New Caledonia, *C. spilothorax* Papuasia, *C. humbloti* Madagascar, and *C. maillardi* (with its variety *macrosceles*) that island, Réunion, and Anjuan (Joanna).

Micrastur, a genus found in Central and northern South America, somewhat resembles *Accipiter*, being brown or blackish above, relieved by rufous or grey and white, and white or reddish below with or without cross-bars. *Geranospizias* ranges further south, *G. caerulescens*, which is slaty-blue, with a few white bands beneath, reaching South Brazil and Bolivia, while the Central American *G. niger* is nearly uniform black. The thighs are closely feathered, and the tibio-tarsal joint is said to act doubly. Five species of *Melierax* or "Singing Hawk," reside in the Ethiopian Region, especially in the south, where *M. canorus* is plentiful. This form is ash-coloured with black primaries, black and white tail, and white belly with greyish bars. The habits are bold, the flight is rapid, the food consists of small mammals, birds, reptiles, and locusts. The haunts are in rocky places or bush country; the nest of sticks, lined with wool and feathers, is placed in a tree, and contains from three to five whitish eggs. The mellow whistling or piping song is heard chiefly in the morning and evening, the wide-spread African *Asturinula monogrammica* alone of the Family vying with it in sweetness.

Astur comprises forty or more members, several of which have exact counterparts in the genus *Accipiter*.[1] The more robust build, shorter legs, and stouter toes serve as distinctions; but it must be noted that short wings, long legs, and bill without a notch mark all Accipitrine as opposed to Falconine forms. The descriptions below will be sufficient to shew the coloration, as the species, except *A. novae hollandiae*, are very similar. Inhabitants of the woodland and river-side, they are nearly cosmopolitan, though absent in parts of the Neotropical Region and in New Zealand; while several islands have peculiar races. *A. palumbarius*, the Goshawk, called of old the "Gentle Falcon," is now seldom observed in Britain, though once it nested in Scotland; it ranges throughout Europe and Asia to Morocco, and thence to the Himalayas and Japan, or slightly further south in winter. It is ashy-brown above, with four dark bands on the white-tipped tail, and is closely barred with brown and white below. Daring and rapacious, with marvellous power of steerage, it follows the abruptest turns of its victims with the greatest ease, gliding after them in a low, persistent style, termed by falconers "raking." The food consists of small mammals and birds, but *A. badius* and *A. tachiro* will eat

[1] J. H. Gurney, *Ibis*, 1875, p. 468.

frogs, and the latter limpets; the large flat nest of sticks, rarely lined with roots, is placed in trees, the bluish-white eggs, numbering from three to five, being occasionally marked with rust-colour. The barely separable North American *A. atricapillus* exhibits very close bars below; the crested *A. trivirgatus*, ranging from India and the Great Sunda Islands to Formosa, is slaty-grey, having a rufous chest, a white throat with black median streak, a tail with four brown bands, and white under parts barred with rufous and brown; *A. badius*, the Shikra, extending in its various sub-species from Central Russia, Servia, and Greece to China, and many parts of Africa, is blue-grey with five or six blackish tail-bands, a less distinct throat-streak, and salmon-coloured lower surface with narrow white cross-bars. *A. trinotatus* of Celebes is blackish-grey, with lighter head, white spots on the median rectrices, uniform vinous breast, white throat and vent; the young are ferruginous-red above with black markings. Most remarkable of all is *A. novae hollandiae* of Southern Australia and Tasmania—with its smaller race *A. leucosomus* of Papuasia and the Cape York district—pure white in colour, with black bill, yellow cere and red irides, which some writers consider a permanent albino of *A. cinereus*. *A. hensti* and *A. franciscae* are confined to Madagascar, *A. brutus* and *A. pusillus* to Mayotte and Joanna Islands of the Comoros respectively. *Nisoïdes moreli*, also from Madagascar, a bird with stout bill and white irides, closely approaches *Astur*.

Accipiter is a genus of some thirty species, which rival Goshawks in spirit and daring; they inhabit nearly the whole world, but hardly extend to Polynesia. The flight is quick and vigorous, with rapid turns; the prey being captured with a dash as the birds skim through the wooded country they frequent; while it is subsequently devoured on the ground, as is customary among Accipitrine forms. The large flat nest of twigs, occasionally lined with roots or leaves, is placed on a tree or rocky ledge; about four to six bluish-white eggs, usually with heavy blotches or spots of red-brown, being laid in the central depression. Very puzzling are the changes of plumage, though by no means confined to this genus; but the longitudinal spots below in the young are said generally to change with age to transverse bars, as is the case in the most typical Falcons.[1] The coloration is well shewn by *Accipiter nisus*, the Sparrow-Hawk, which breeds throughout Europe, North Africa,

[1] Cf., however, Sharpe, *P.Z.S.* 1873, pp. 418, 419.

and Asia north of the Himalayas; extending further south in winter, but represented in South Africa by *A. rufiventris* and *A. ovampensis* with white-spotted rectrices. It is bluish-grey above, with white mottlings on the nape and rufous cheeks, the white-tipped tail exhibiting from three to five dark bands, and the buffish-white under parts red-brown bars. Other species are blacker or browner, or more rufous below; *A. rubricollis* and *A. erythrauchen* of the Moluccas have the nape red; the latter, *A. rhodogaster* of Celebes,

FIG. 40.—Nest of Sparrow-Hawk. *Accipiter nisus.* (From *Poachers.*)

A. virgatus of India and East Asia (including *A. nisoïdes*), *A. hartlaubi* of the Gaboon, and *A. ventralis* of Venezuela, Colombia, and Ecuador, have nearly uniform ruddy under parts; *A. erythrocnemis* of Brazil and Bolivia, and *A. chionogaster*, ranging from Guatemala to Venezuela are almost white beneath; *A. bicolor* of Central and South America having grey-blue for the white. *A. melanoleucus* of North-East, West, and South Africa is deep black, with brown bars on the rectrices, and some white on the

tail-coverts and breast; *A. pectoralis* of Brazil is brownish-black above, slightly relieved by white, the tail being greyish with black bands, the collar and chest rufous, the fore-neck and abdomen white, streaked and barred respectively with black. *A. minullus* inhabits South Africa, *A. madagascariensis* Madagascar, *A. cirrocephalus* Australia, Tasmania, and Papuasia, *A. chilensis* Chili, *A. guttatus* Paraguay and Bolivia, *A. pileatus* Brazil, *A. collaris* New Granada; while the very robust *A. cooperi* occupies North America southwards to Mexico, and *A. fuscus* the same country to Panama. In *A. subniger* (*tinus*), of Central and South America, and some other species, the young are red above. *Erythrotriorchis radiatus* of East and Central Australia, a rufous bird with dark markings, which lays an egg like that of a Sparrow-Hawk, may perhaps be placed here, as may *Megatriorchis doriae* of New Guinea, in which the blackish upper parts have lighter transverse stripes, and the white under parts longitudinal dusky streaks.

Sub-fam. 4. *Aquilinae*.—The long-legged *Morphnus guianensis*, ranging from Panama to Amazonia, is black, with three ashy tail-bars, brown head and chest, and white rufous-banded abdomen; the fine crest is brown with black tip, the wing- and tail-coverts are varied with white. This bird haunts thick woods near water, and in habits appears to resemble the next two genera, which have similar soft plumage, short wings and long tails. *M. taeniatus* of Ecuador has broader and blacker bars below. *Harpyopsis novae guineae* of New Guinea, and *Thrasaëtus harpyia*, the Harpy, extending from Mexico to Paraguay and Bolivia, have blackish-grey upper parts with a tendency to darker transverse markings; the tail shews six black bars; and the white under parts exhibit a greyish zone on the chest. The former species is, moreover, relieved by white above, while a bifurcated grey crest surmounts the white head and neck of the latter. Marvellous stories have been told of the fiereeness and strength of the last-named, but despite its huge bill and legs, it seems never to attack man, though defending itself with spirit when wounded. Found in low-lying forests and near rivers, it may be seen wheeling in circles with slow heavy flight, or digesting its meals on low boughs of trees. The diet consists largely of mammals, including fawns, monkeys, foxes and peccaries; the nest is in high trees or cliffs. The Indians are very proud of a living specimen, while the down is used for decoration, and the feathers for arrow-making. *Harpyopsis* devours wallabies.

Pithecophaga jefferyi, a fine forest Eagle from the Philippines, with extremely deep and compressed bill, seems to belong here.[1]

The true Eagles—fierce but seldom courageous—inhabit wild mountains, plains, or forests; resembling Buzzards in their slow heavy flight, and rarely uttering their shrill cry or yelp. The prey is generally secured by a pounce; and carrion, if fairly fresh, is eaten. The nest of sticks or twigs, lined with grass, green foliage, fur or wool, especially the two first, contains from one to three large white eggs, with or without red or brownish markings.

The various species of *Spizaëtus*, *Limnaëtus*, *Lophotriorchis*, *Lophoaëtus*, *Neopus*, and *Nisaëtus*, with comparatively short wings, long tails, and large claws, are sometimes denominated Hawk-Eagles. Not usually shy, they are essentially denizens of wooded country, where some prefer the hilly districts, others the neighbourhood of streams; the food is extremely varied, including in different cases, monkeys, bucks, lambs, goats, hares, rabbits, birds as large as bustards and geese, lizards, frogs, or even fish; while the flight is more graceful and Falcon-like than in the genus *Aquila*, the note clearer and sharper. The moderately large nest is composed of sticks, and usually lined with green leaves or branchlets; the one or two eggs are white, ordinarily with light reddish-brown markings. *Spizaëtus coronatus* of South and West Africa is blackish above, with a little white on the tail-coverts and remiges, and brownish tips to the triply-barred rectrices, the buff lower parts being broadly banded with black. *S. tyrannus*, extending from Guatemala to Brazil, is black beneath; *S. ornatus*, of Central and South America as far as Paraguay, has the nape and sides of the neck and chest tawny. These birds have an occipital crest, as have some members of the hardly separable *Limnaëtus*, of which *L. caligatus*, of India and the Malay countries, deep brown in colour, with ashy inner webs to the remiges, will serve as an example. *L. nipalensis* and *L. cirratus* inhabit India with Ceylon, and the former Formosa and Japan; *L. philippensis* the Philippines; *L. alboniger* Malacca and Borneo; *L. lanceolatus* Celebes and the Sula Islands; *L. gurneyi* New Guinea and the Moluccas; *L.* (*Lophotriorchis*) *kieneri* India, Malacca, Borneo, and Batchian; *L. isidori* north-western South America. *Lophoaëtus occipitalis*, of Africa south of the Sahara, is brown, except for a few white marks above, and has shortly-feathered white metatarsi.

[1] Ogilvie Grant, *Ibis*, 1897, pp. 214-220.

Here the crest is extremely long, but in the nearly black *Neopus malayensis*, ranging from India to the Moluccas, it is much shorter. *Spiziastur melanoleucus*, extending from Guatemala to Brazil, is brownish-black, with white head, neck, and lower surface, the tail has four darker bands, and black marks shew towards the crest. In this species the inner claw and hallux are greatly developed. *Nisaëtus pennatus*, the "Booted Eagle" of South Europe, Africa, and thence to India and Ceylon, so called from the feathered legs, is brown above, with a white shoulder-patch, white tip to the barred tail, and various buffish markings; the head, neck, and under parts are fawn-coloured, with brown streaks except on the abdomen. *N. fasciatus*, Bonelli's Eagle, has a similar range, but reaches China, and not South Africa; it lacks the shoulder-patch, but is streaked on the abdomen. *N. morphnoïdes* inhabits Australia and New Guinea, *N. spilogaster* and *N. bellicosus* Southern Africa, the last being slaty-black above, and having a plain brown chest.

The typical Eagle, the bird of Jove, the emblem of Rome and of St. John, was some species of *Aquila*. *A. chrysaëtus*, the Golden or Black Eagle, is exceptionally shot in England in winter—especially in the north; but it is the Sea Eagle that occurs most frequently. In North Britain the former has bred in increasing numbers since protection has been given in deer-forests, where it kills the grouse which startle the stalker's game; a few pairs remain in North and West Ireland; while in times past it ranged to the Peak of Derbyshire or even Snowdon. Abroad it occupies most of Europe, North Asia to India and China, North Africa, and North America to Mexico. Powerful and fierce by nature, and ready to attack animals of considerable size, it never molests man under ordinary circumstances; both parents, it is true, circle anxiously round when the young are in danger, but should the nest contain eggs, the hen, which sits closely, vanishes at once on leaving them. She does not reappear until all risk seems past, while the cock is seldom sighted at the eyry, though usually seen in the vicinity. The prey consists of antelopes, wolves, foxes, fawns, lambs, hares, rabbits, marmots, geese, ducks, grouse, and so forth, with carrion, if sufficiently fresh: the ground is often quartered at a low elevation, and wonderfully rapid in the chase is the flight of this apparently slow and ponderous bird, aided by its extraordinarily keen powers of vision. Solitary individuals may occasionally be approached by stalking, but in Britain they are generally wary, owing to constant

disturbance; they may, however, often be seen circling aloft or winging their way to great distances, while they can hardly be distinguished from Buzzards in misty weather even by experienced keepers. Captures are made with the talons, but Eagles are comparatively seldom trained for Falconry; yet the present species has been so used in Europe, as well as by the Kirgiz Tartars, who call it "Bergut" or "Bearcoot." The cry is shrill and yelping. The nest is commonly placed in a tree, though in Scotland such sites are seldom utilized nowadays, a projecting rock on the side of some bare mountain-glen or a sea-girt crag being selected instead. Here a cavity, rather than a ledge, is chosen, and a huge mass of sticks or heather is collected, with a bedding of hair, fur, wool, moss, dry fern and an occasional feather, or more commonly of tufts of *Luzula sylvatica*, garnished with an odd pine-shoot. Two or three eyries are often used in turn, the pile increasing on each occasion. At times the spot can be reached without a rope by a skilful climber, and in some countries nests have been found upon the ground. The two or three eggs—four being quite exceptional—are generally marked with red-brown, crimson, purplish or grey, but, though fine blotches are usual, one, if not more, of the set is frequently white. They are laid very early in spring and—as in other Birds of Prey—not always on successive days. The Golden Eagle is distinguished from the Sea-Eagle (p. 163) by the feathering reaching to the toes, which have only the last joint scutellated, and the remainder reticulated: the adult is normally blackish-brown, with tawny lanceolate nape-plumes and tail mottled with grey; the young have white bases to the rectrices. The colour, however, varies much.

Aquila clanga, the Spotted Eagle of British lists, and its smaller form, *A. pomarina*, range across Europe, except the most northern portions, and extend to North Africa, India, and North China, their respective distributions being somewhat uncertain. The colour is brown, with pale nape and light margins to the feathers of the wings and rump; the manners are those of Eagles generally, but the food includes frogs, reptiles, and grasshoppers, in addition to small mammals and birds. *A. hastata* of India is hardly separable, and the African *A. wahlbergi* is very similar, as is the larger *A. nipalensis*, the Steppe Eagle of the former country, Eastern Europe, Eastern Asia, and, exceptionally, North Africa, a plain brown bird with a fulvous nuchal patch. It commonly builds its nest

upon the ground. *A. adalberti*, the White-shouldered Eagle of Portugal, Spain, and North-West Africa — often wrongly called "Imperial,"—preys upon lizards, snakes, hares and rabbits, which it usually spies from a perch on some bare tree-top. It is black, with brownish neck, greyish base to the tail, and a broad white shoulder-patch, whereas *A. mogilnik*, the true Imperial Eagle, ranging from Central Europe and North-East Africa to India and China, differs in having the head and neck creamy yellow, and only the scapulars white. *A. rapax* (*naevioïdes*), the Tawny Eagle of most of Africa, rarely found in Europe, is remarkable for the parti-coloured feathers of purplish-brown and rufous on the upper parts; otherwise it is brown, slightly streaked with fulvous below. The smaller *A. vindhiana* and *A. fulvescens* of India are very like it, while *A. verreauxi* of Abyssinia and South Africa is jet black with white rump and lower back. *Uroaëtus audax* of Australia and Tasmania is black, and has a wedge-shaped tail, the bright chestnut nape being streaked with black, and the head with white.

Of the Sea Eagles, characterized by very large bills and nearly bare metatarsi, the biggest is the fish-eating *Thalassaëtus pelagicus*, brown in colour, with white cuneate tail, rump, thighs, and patch on the wing-coverts. It inhabits the coasts, lakes, and rivers of North East Asia, the Liu-Kiu Islands and Japan, rarely wandering to America. *T. branickii* of Corea is slaty-black, with only the tail and its coverts white. *Haliaëtus albicilla*, the Erne or Sea-Eagle, of which a few pairs remain in Shetland and the west of Scotland and Ireland, used to breed at least as far south in England as the Isle of Man and the Lake District, while in winter immature or even adult specimens still frequently occur in various parts. Generally distributed over the Old World from Greenland to Kamtschatka, it breeds also in the Danube valley, Turkey, Greece, and Egypt, migrating to the Canary Islands, North Africa, Japan, China, and occasionally the Commander Islands. It is brown with white tail, the full plumage not being attained for nearly six years; but very old examples become whitish on the head and neck. In most of its habits it resembles the Golden Eagle, though the note is shriller, and the food consists largely of fish, seized in the talons as it swoops down; it is said to be very destructive to lambs, and, as it eats carrion, it is readily poisoned. In Britain the eyries are now in precipitous sea-cliffs, but of old inland rocks and trees were utilized, as is the case abroad, while

in Egypt nests have been found upon the ground in marshes; the two or three white eggs, laid early in the year, are rarely marked with rufous. The representative American species *H. leucocephalus*, the Bald Eagle, has the head, neck, rump, and tail white, and ranges from the North to California and Mexico. *H. leucocoryphus*, with the middle of the tail and the cheeks white, extends from South-East Europe to East Siberia, China, and Burma; *H. leucogaster*, a greyer bird with white head, neck, under parts, and end of the tail, occurs from India and China to Australia and the Friendly Islands; *H. vocifer* with white head, neck, breast, and tail, but chestnut belly, occupies the Ethiopian Region; *H. vociferoïdes* of Madagascar is intermediate between the last-named and *H. leucocoryphus*. The river-haunting *Polioaëtus ichthyaëtus*, of the Indian Region and Celebes, is brown, with grey head and neck, white abdomen and tail, the latter broadly tipped with brown; *P. plumbeus*, of similar range, lacks the white base of the tail. The huge nest is placed in a tree and is often lined with green leaves, the two or three eggs being white; the note is loud and plaintive, and the food consists chiefly of fish.

Sub-fam. 5. *Butconinae*, or Buzzards and Kites.—In this group the Rough-legged Buzzards (*Archibuteo*) are separated from the genus *Buteo* on account of their feathered metatarsi. *A. lagopus*, well-known in Britain from the numbers which frequently appear in autumn, is alleged to have bred once in Yorkshire, while in Northern Europe it is common, extending thence to about the Lena in Asia, and migrating in winter to South Europe, Turkestan, and even Natal. At the same season a darker sub-species *A. sancti johannis*, which breeds north of the United States, occurs southwards to Mexico. The former bird is cream-coloured, with brown markings of various depth, becoming more streaky below; the tail shews a white base and three or four dark cross-bars, of which the sub-terminal is very broad. In Scandinavia, when there is a plague of lemmings, it is as valuable an ally as the owls; the habits being identical with those of *Buteo*. *A. ferrugineus* of western North America has the upper surface and thighs ferruginous with brown streaks, the head, neck, and tail whiter, and the under parts nearly pure white. *A. hemiptilopus* (*strophiatus*) of Nepal and Tibet is nearly uniform brown with a white pectoral band.

Buteo is a genus of some thirty species, which together inhabit nearly the whole globe, except the Australian region; the

only form thence recorded seeming to be *B. solitarius* of the Sandwich Archipelago — the *Pandion solitarius* of Cassin and so-called *Onychotes gruberi* of Mr. Ridgway. All may be represented both in appearance and manners by *B. vulgaris*, the Common Buzzard, which breeds not uncommonly in a few wild districts of Britain, chiefly towards the west, and is found on migration in other parts. Abroad the range includes the Atlantic Islands, West and Central Europe, whence it strays at times to Eastern Europe, Asia Minor, and North Africa; the resident bird of those countries, however, is *B. desertorum*. The colour above is brown, with slight white marks and twelve dusky bars on the tail, the lower surface being yellowish-white with brown streaks; but varieties are very frequent in the genus, and these may be either darker or exhibit creamy tints, a trimorphic tendency of which the Sandwich Islands form is a notable instance. The English name Puttock and the Welsh Cetn appear to be applied indiscriminately to the Common Buzzard and the Kite. The flight is powerful, though slow and heavy, nor is it uncommon to see individuals circling in the air or poising themselves aloft on motionless wings; when quartering the ground the movements are not unlike those of Harriers, but the style is more steady, and the operations less protracted. Much of the food consists of small mammals, and especially rodents; it includes, however, small birds, reptiles, frogs, beetles, and grasshoppers; and many gamekeepers now recognise the bird's utility by protecting its breeding-quarters. Its congener *B. jakal* is even more useful, and destroys large or venomous snakes. Furthermore, the custom of darting upon the prey from some post of vantage remains to be noticed. The nest, commonly situated in trees, is equally often in rocks; those selected not being necessarily lofty, but frequently mere outcrops on the sides of hill-valleys, in which case access is easy even without a rope. The materials used are much the same as in the case of the Golden Eagle, but finer; a like fancy being shewn for green foliage, though ivy and so forth take the place of pine-shoots, as being more readily obtainable. The eggs are white or greenish, commonly blotched or spotted to a greater or less extent with dark brown, red, or lilac; the hen sits very closely, the cock meanwhile soaring above the intruder's head, and uttering his characteristic cat-like mew. *B. desertorum*, of all Africa, South-East Europe, and the countries to India inclusive, which has been

recorded three times in England, is smaller and more decidedly rufous than *B. vulgaris*, though hardly distinguishable when immature; while the bigger *B. ferox* of similar range, though apparently limited in Africa to the North, is closely allied; as are *B. plumipes*, extending from India to Japan (of which *B. leucocephalus* is a large and probably distinct form) and *B. swainsoni* of North America, which migrates as far south as Patagonia, and has almost uniform upper parts and chest. *B. borealis*, the "Red-tailed Hawk," occupying with its various races the whole of North America, has a rufous tail with lighter tip and usually a single blackish band, the breast being sooty-black or white, with or without a reddish tinge; *B. albicaudatus*, reaching from Texas to Brazil, is slaty-grey, with rusty markings on the mantle, white under parts and tail, the latter shewing grey bars and a wide subterminal black cross-belt; while *B. abbreviatus*, found from the southern United States to northern South America, is almost black, with three broad grey and white zones across the rectrices. *B. augur* and *B. auguralis*, both from North-East and West Africa, with *B. jakal* of South Africa, have the upper parts black, some grey on the wings, and the tail chestnut except near the end. The first has a black throat with white streaks and white lower surface, the second a red-brown chest and black spots on the belly, the third is black below with a whitish pectoral patch. Finally, omitting several American species from want of space, *B. brachypterus*—a miniature Common Buzzard—is peculiar to Madagascar, *B. galapagensis* to the Galápagos, *B. exsul* to Masafuera, *B. poliosomus* to Chili, Patagonia, and the Falklands.

Parabuteo unicinctus, ranging from the southern United States to Chili and Argentina, a sluggish carrion eater, is sooty-brown with rufous on the wing-coverts and thighs, and a white base and tip to the tail. *Buteola brachyura* and *B. leucorrhoa* of tropical America, separated from *Buteo* by a central tubercle in the nostril, are black above; the former being white below and having four dark bars on the ashy tail, the latter only shewing white at the base of the black rectrices, which are crossed by one grey bar.

Asturina, placed near *Astur* by some authors, includes two species with Buzzard-like habits, that build slight nests and lay greenish-white eggs. *A. plagiata*, found from the South-West United States to Panama, is grey, barred with black on the primaries and with white below, while a white median band

crosses the rectrices, of which the coverts are black and white. *A. nitida*, reaching from Panama to south-east Brazil, differs in having white bars above. *Rupornis magnirostris* of Colombia, Guiana, and Amazonia—hardly separable from *Asturina*—has three black belts on the tail and is rufous instead of grey beneath; *R. ruficauda* of Central America, *R. pucherani* of Brazil, Paraguay, and Argentina, and its Bolivian race *R. saturata*, have the chestnut remiges and rufous rectrices crossed with blackish, and the under surface as in the first-named, but the second is browner and shows a creamy patch on the primaries; *R. nattereri*, of Peru and Brazil, combines the chestnut primaries with an ashy and black tail; *R. ridgwayi*, of Haiti, is chiefly rufous and brown above, and slate-coloured with white bands below. *R. pucherani* is very noisy and eats fish.

Butastur teesa (with its sub-species *indicus*) ranges from Japan and China to New Guinea and India; it is reddish-brown, varied with white on the nape and rump, the tail and lower parts being rufous, with black and white bars respectively. *B. liventer*, found from Burma to Celebes, is ashy below; *B. rufipennis* of North-East Africa, has streaks in place of bars. The pugnacious Indian form has a mewing cry, feeds upon small mammals, lizards, frogs, and crabs, and builds its nest almost entirely of twigs, laying some three bluish-white eggs. *Geranoaëtus melanoleucus* of western and southern South America, the so-called Chilian "Sea-Eagle," is black with grey wings and white belly, both barred with dusky; the flight is vulturine with spiral gyrations, the note is piercing; the food consists of carrion from the beach, small mammals, birds, and grasshoppers. The nest, placed in a tree or crag, is composed of sticks and grass, the two white eggs being blotched with pale red. It is often seen inland.

Leucopternis is a genus of eleven members, of which *L. ghiesbreghti*, of Central America, is snowy-white, with most of the wings and a zone on the tail black. The other forms, whereof three inhabit Brazil, are black or slate-coloured above with white markings, the lower surface being grey in *L. plumbea* of Ecuador and Panama and *L. schistacea* of Colombia and Amazonia, but barred with black and white in *L. princeps*, of Costa Rica. *Urubitinga zonura*, a black bird with white tip and base to the tail, ranges from Mexico to Chili and Argentina;

U. anthraeina, found from Arizona and Texas to northern South America, has in addition a white belt across the rectrices.

The crested *Harpyhaliaëtus coronatus*, extending from Bolivia and Brazil to Patagonia, a powerful and savage bird with a taste for carrion, is chocolate-brown, with grey on the wing, and a tail like that of the last species; *H. solitarius*, darker in colour and doubtfully distinct, reaching Mexico northwards. *Heterospizias meridionalis*, of northern South America to Bolivia and Paraguay, is mottled with rufous, grey, and black, and has two white bands on the tail. *Buteogallus aequinoctialis*, of Guiana and Colombia, is black relieved with rusty above, and reddish with black bars below, the remiges being chiefly chestnut, and the tail indistinctly barred with white. *Busarellus nigricollis*, of Guiana and Brazil, is brighter chestnut with black streaks, the head being buffish, the lower throat, primaries, and most of the tail black. It has a harsh cry, and loves sitting on stumps near water, while the rugose soles of the feet assist it to secure the fishes and molluscs on which it—as well as *Buteogallus*—feeds.

Of the forms with comparatively weaker feet, *Haliastur indus*, the "Brahminy Kite" or "Pondicherry Eagle," reaching from the Indian Region to Australia and New Guinea, is chestnut with darker wings, the white head, neck, and lower parts being streaked with black; *H. sphenurus*, of the two latter countries and New Caledonia, named by colonists the "Whistling Kite," is ashy-brown, with rufous head and ochraceous breast striped with brown. The note is shrill, the flight easy and buoyant, the food composed of garbage, small mammals, birds, lizards, frogs, crustaceans, insects and their larvae; while fish are secured by grasping them with one foot during gliding movements along the surface of the water. The Australian species attacks poultry, but is of great utility in devouring caterpillars during insect-plagues. The nest of twigs, lined with grass, roots, hair, or green leaves, is adorned with rags and the like, the two or three eggs being greenish-white, rarely with rusty markings.

Milvus ictinus, the Red Kite or Fork-tailed Glead of the Old World, ranging from the Atlantic Islands—except, perhaps, the Azores—through most of Europe to Palestine, Asia Minor, and Northern Africa, but leaving the northerly districts in autumn, is red-brown above and rusty-red beneath, the lower surface and the whitish head being streaked with dark brown. It is still

known to breed in certain parts of Northern and Western Britain, though no longer the ubiquitous scavenger of the streets, so common even in London three or four centuries ago. Bold thefts of poultry from farmyards and linen from drying-grounds then counterbalanced its utility, but none the less may we regret the almost total extermination of this fine tenant of the air, caused by the increase of fire-arms and the discovery that

Fig. 41.—Red Kite. *Milvus ictinus.* $\times \frac{1}{8}$. (From *Bird Life in Sweden.*)

its tail-feathers make the choicest salmon-flies. Not unlike a Buzzard when aloft, the shrill whistling note, when heard, constitutes a clear mark of distinction; while the broad wings and long deeply-forked tail bestow such graceful ease of motion and perfect steerage power as few birds can claim, whether for soaring and circling aloft, quartering the ground for booty, or hovering over the water to fish. It is not always, however, that the forked character of the tail is apparent, for when fully open it looks square, just as a square tail seems rounded. This species

is somewhat gregarious and sluggish, and feeds on offal, small mammals, birds, reptiles, fish, amphibians, insects and their larvae. The nest is a mass of sticks, rags, paper, and rubbish generally, placed in a tree or rarely in a rock; the three, or exceptionally four, eggs being like those of the Buzzard, but duller and with more lilac tints. *Milvus migrans*, the Black Kite, once recorded in England, extends throughout Central and Southern Europe, and probably to China, breeding in North-Western and migrating to Southern Africa. The upper parts are dark brown, the under parts rufous, and the head whitish, the two latter being streaked with dusky; the bill is black and the tail moderately forked. Barely separable from this bird are *Milvus aegyptius* of Africa, Madagascar, South-East Europe, and West Asia, with yellow bill; *M. affinis*, of Papuasia and Australia, possibly reaching Ceylon; *M. melanotis*, extending from India to Lake Baikal, China, and Japan; and the smaller *M. govinda* of somewhat similar range. The third and fourth have a white patch beneath the primaries. The last-named, or Pariah Kite, is the scavenger of Hindostan, and is even bolder than its congeners; the habits, however, are similar, as are those of the Australian *Lophoietinia isura*, separated from *Milvus* on account of its square tail. This species has a fine crest, and differs, moreover, in its browner crown and greyer rectrices with whitish coverts.

Gypoictinia melanosternon of Australia has a black head and lower surface, chestnut occiput, nape, and thighs, and brownish- or rufous-black upper parts, the wings and rounded tail being marked with greyish white. Like a Kite in manners, it eats snakes and lizards, and is said to destroy Bustard's and Emeu's eggs.[1] *Elanoïdes furcatus*, the lovely Swallow-tailed Kite, caught once in England, and ranging from the Middle United States to Brazil, is black, with purple and green reflexions, white head, neck, rump, inner secondaries and under parts, bluish bill and feet. With splendid powers of wing, it may be seen gliding rapidly through the air, skilfully quartering the ground, or circling aloft with its long forked tail outspread, to perform doublings and evolutions of every description. It catches bees or other insects in one claw and eats them as it flies, or snatches up a lizard, snake, or frog, to be devoured at leisure, small birds and grubs varying the diet. Flocks are often seen, which

[1] Cf. North, *Nests and Eggs of Australian Birds*, Sydney, 1889, pp. 11-13.

hang round a wounded individual like Terns. In the nest and eggs this species and the last resemble their kin, though using no rubbish in building. *Nauclerus riocouri*, of inter-tropical Africa, a miniature *Elanoïdes*, is grey, with white face and lower surface.

Gampsonyx swainsoni, of Trinidad, Guiana, Colombia, Peru, and Brazil, is grey, with yellow face, white collar, under parts and tips to the secondaries; a black patch relieving each side of the breast and one of red the upper back. The tail is rounded in this and the succeeding genus. *Elanus cæruleus*, the Black-winged Kite, straying to South-West Europe, but properly ranging from the South-East to India, Ceylon, and all Africa, is ashy-grey above with a black patch on the wing-coverts; the face, lateral rectrices, and all the lower plumage being white, and the irides red. A sub-species, *E. hypoleucus*, occupies Borneo, Java, the Philippines, and Celebes. *E. scriptus* of Australia, *E. axillaris*, extending thence to Java, and the hardly separable *E. leucurus* of tropical and sub-tropical America, are marked with black on the under wing-coverts, while the first has black axillaries also. These buoyant birds are fond of perching, but soar with ease, quartering the plains like Harriers, or hovering with uplifted wings to dart down upon their prey of insects, snakes, small mammals, and more rarely birds. The cry is mournful; the small nest, of sticks, grass, and moss, is placed in trees: the three, four, or even eight white eggs being heavily blotched with red. *Ictinia mississippiensis*, the Mississippi Kite, found from the Southern United States to Guatemala, and represented from Mexico to Paraguay by the black-winged *I. plumbea*, is lead-coloured, with black notched tail and rufous inner webs to the primaries; its manners correspond to those of *Elanoïdes*, but the eggs are white.

That most abnormal form *Rostrhamus sociabilis*, the Awl-billed or Everglade Kite, ranging from Florida and Cuba to Bolivia and Argentina, is slaty-black, with white base and tip to the brownish emarginate tail, orange cere and feet, and crimson irides. The extraordinarily slender bill with long terminal hook no doubt assists greatly in extracting from their shells the molluscs, such as *Ampullaria*, on which this species entirely subsists, while its long legs and sharp talons help to secure the prey in the muddy swamps it frequents. Mr. Gibson[1] tells us that it is to some extent gregarious, and is often seen slowly beating over the

[1] Cf. *Ibis*, 1879, pp. 413, 414.

marshes, or poised aloft with its broad expanded tail alone in motion, a "creaking" or "neighing" alarm-note being apparently the only cry. Twenty or thirty nests are commonly built close together, and are slight platforms of twigs or plant-stems, with a lining of aquatic herbage, supported on the reeds or bushes a few feet above the water. The two or three eggs are whitish with reddish- or yellowish-brown and grey blotches. The breeding-quarters are constantly changed.

Machaerorhamphus alcinus, of Tenasserim, Malacca, Borneo, Sumatra, and New Guinea, is especially remarkable for the wide gape of the short bill, which recalls that of the Caprimulgidae. All the tail-coverts are unusually elongated, a fine crest of pointed feathers adorns the occiput, and the plumage is black with a chocolate tinge, the throat and middle of the chest being white, with a broad black streak down the former. *M. anderssoni*, of Damara-Land, the Cameroons, and Madagascar, known to have crepuscular tendencies and to feed partly on bats, is smaller, and has a white abdomen; *M. revoili*, of Somali-Land, is intermediate.

Pernis apivorus, the Honey-Buzzard, which still breeds occasionally in Britain in June, when the dense foliage easily causes it to be overlooked, inhabits Europe generally, and probably extends to Japan, migrating in winter to Madagascar and South Africa. The extremely complex phases of plumage make it uncertain whether it shares the Indian Region with the similar but crested *P. ptilorhynchus* (*cristatus*), from which *P. tweeddalii*, of Sumatra, is doubtfully separable. The upper parts are brown, with greyish head and three or four dark bands on the tail, the lower white with brown spots and bars. White mottlings usually shew above, and the female has the crown brown. The shortly-feathered lores distinguish *Pernis* from *Buteo*. Our woodland species feeds upon the ground, and devours bees, wasps, and grubs—though not honey—from the comb, together with small mammals, birds, slugs, and worms; the cry is shrill, but seldom heard; the nest, composed of sticks lined with leaves, contains two or three whitish eggs with rich purplish-red or brown markings. *P. celebensis* differs in the rufous chest, which exhibits black streaks, that are continued to the white throat with its black longitudinal band; the adult closely resembles *Limnaëtus lanceolatus*, both being peculiar to Celebes. *Henicopernis longicaudatus*, of Papuasia, is brown barred with black above, and white streaked with blackish below,

the tail shewing five black bands; *H. infuscatus*, of New Britain, is a darker race. *Regerhinus uncinatus*, and the larger *R. megarhynchus*, found from Central America to Bolivia and Brazil, are dusky slate-coloured with a white tail-bar; *R. wilsoni*, of Cuba, has a yellow bill; *R.* (*Leptodon*) *cayennensis* is glossy black, with grey head, wing and tail-bands, and white lower surface. Immature birds are brown, with rufous and white streaks or bars below.

Sub-fam. 6. *Falconinae*.—The true Falcons are remarkable for a notched maxilla, while *Harpagus* and the crested *Baza*, aberrant members of the group, and sometimes classed with the Kites, exhibit two "teeth." *B. lophotes*, of India, Ceylon, and the Malay countries, is greenish-black above, varied with white and chestnut on the wings; the fore-neck being white, and the breast shewing a band of black above one of chestnut, which is barred with buff towards the black vent. *B. verreauxi*, occurring from the Zambesi to Natal, is dark brownish-grey, with four black bars on the white-tipped tail, and rufous bands across the white breast and under wing-coverts; *B. cuculoïdes*, of West Africa, having the latter plain rufous. The somewhat similar *B. subcristata* occupies North-East Australia, *B. rufa* inhabits the Moluccas and Papuasia, *B. timorlaensis* Timor-laut, *B. erythrothorax* Celebes and the Sula Islands, *B. magnirostris* the Philippines, *B. borneensis* Borneo, *B. leucopais* Palawan, *B. sumatrensis* Sumatra, Tenasserim, and Sikkim, *B. ceylonensis* Ceylon and South-East India, *B. madagascariensis* Madagascar, and *B. reinwardti*, with grey-barred breast, the Moluccas, Timor, and Papuasia. Comparatively little is known of the habits of these shy forest forms, which occasionally soar, feed upon the ground on chamaeleons, grasshoppers and other insects. build small nests, and lay about three whitish eggs with brown markings. *Harpagus diodon*, of British Guiana and Brazil, is grey. with brown wings and tail barred with whitish, white throat with a black streak, rufous thighs and under wing-coverts. *H. bidentatus*, extending from Panama to Brazil and Peru, has chestnut under parts, *H. fasciatus* being hardly separable.

Of the tiny eastern "Finch-Falcons," *Microhierax fringillarius*, inhabiting the Malay Peninsula and Great Sunda Islands, is bluish-black, with rufous throat and abdomen, the breast, forehead, a stripe down each side of the neck, and partial bars on the wings and tail being white. It is a bold dashing species, which feeds upon insects and birds—even as large as quails, and lays four white eggs in holes

in trees upon a bed of chips, leaves, and insect-débris. *M. latifrons*, of Borneo and the Nicobars, has a much wider frontal band; *M. melanoleucus* of Assam and Cachar, *M. erythrogenys* of the Philippines, and *M. sinensis* of China are quite white below; but the second has black thighs and the third a white nape, a character shared by *M. cutolmus*, ranging from India to Cambodia, wherein the throat and abdomen are chestnut. *Poliohierax semitorquatus*, little bigger than the foregoing, inhabits North-East and South Africa, the male being blue-grey with white forehead, cheeks, nape, rump, under parts and markings on the remiges and rectrices; *P. insignis* of Borneo and Siam is larger, with black shaft-stripes, but no white collar. The females have the mantle, and in the last-named the crown, chestnut. The African species rarely soars, but haunts low trees and bushes, occasionally flocking, and feeding on mice, small birds, lizards, and coleopterous insects. *Spiziapteryx circumcinctus*, of Chili and Argentina, is brown above and whitish below, with numerous dark streaks; the white eyebrows meet at the nape, and white spots and bands mark the remiges and lateral rectrices.

Dissodectes ardesiacus, of Arabia, North-East and West Africa, is slate-coloured with dark shaft-stripes, the wing-quills being brown and the tail interruptedly barred with whitish. *D. dickinsoni* of Benguela, the Shiré and Rovuma valleys, is brown with pale head and white rump; *D. zoniventris* of Madagascar has dark bands on the mantle and on the white under parts. *Hieracidea* (*Harpa*) *novae zealandiae*, the Quail Hawk of New Zealand and the Chatham Islands, is dark brown with rufous and grey barring above; the crown and nape being blacker, the tail shewing eight whitish bands, and the creamy-white lower surface and fulvous thigh-region exhibiting streaks of brown. It may be seen soaring over the plains and lower hills, hovering with expanded tail, or pouncing like an arrow on the rodents, birds, and lizards which form its food. Insects too are captured on the wing, and poultry fiercely attacked. The cry is screaming; the eggs resemble those of the Peregrine Falcon, and are deposited in hollows scraped on rocky ledges, or occasionally in rough nests among thick creepers. A smaller and bolder race has been termed *H. ferox* or *brunnea*, the Bush-Hawk. *H. berigora* of Australia and New Guinea has brown upper parts, with rufous markings that become bands on the white-tipped tail, creamy under parts streaked with

brown, and chestnut thighs. *H. orientalis* of the same countries lacks the red tints, *H. novae guineae* of New Guinea is less spotted. These three Kestrel-like birds love swampy districts, and devour small mammals, birds, frogs, lizards, newts, insects, and even carrion; being valuable allies in caterpillar-plagues, but farmyard pests at ordinary times. The nest of sticks, lined with bark or leaves, is placed in trees, the three or four whitish eggs are blotched with reddish-brown.

The nearly cosmopolitan genus *Tinnunculus* (Kestrel), so called from its querulous "bell-like" note, is separated from *Falco* rather by pattern of colour than structural considerations. *T. alaudarius,* the most plentiful of the British Falconidae—which is occasionally seen in winter near its breeding-quarters, though chiefly a summer immigrant—ranges from the Atlantic Islands and lat. 68° N. in Europe, through Asia to Japan and China, reaching Fantee and Mombasa in Africa, and having been once recorded from Massachusetts in America. The sub-species *neglectus, japonicus,* and *saturatus* are darker than the type; wherein the male is chiefly bluish-grey above, and buff with black spots and streaks below; the chestnut back being spotted with black, and the white-tipped tail having a broad subterminal black band. The female has rufous upper parts, with dark bars continued down the tail. The Kestrel or Wind-hover is a shy arboreal bird of somewhat crepuscular tendencies, generally observed circling gracefully aloft in readiness to drop upon its prey, or "hovering" with rapid vibrations of the long wings, the tail expanded and the head to windward. Small mammals and coleoptera furnish most of the food, a few birds—very seldom game—lizards, frogs, worms, grasshoppers, and insect-larvae varying the diet. Its great utility is now generally recognised, while sensible keepers should be fast learning that all Hawks and Owls are not "vermin." It rarely builds its own nest, but occupies deserted habitations of Crows, Pies, and other birds, relined sparingly with twigs and grass, or scrapes a cup in the soil of some ledge or cavity of a cliff. At times hollow trees, ruins, and chalk-pits are chosen, or even level ground in the fens—pellets of bones, feathers, fur, and beetles' elytra commonly marking the spot. The four to six eggs are creamy-white, blotched or thickly mottled with bright or dull red. *T. cenchris,* the Lesser Kestrel, with white claws, and unspotted back in the male, has four or five times

wandered to England, and ranges from the Pyrenees, Styria, and the Orenburg district to Bokhara and North Africa. It sometimes occurs further north, and in winter reaches Cape Colony; the Indian and Chinese race, distinguished as *T. pekinensis*, having strayed to the Transvaal. *T. sparverius*, the "Sparrow-Hawk" of America from the Great Slave Lake to Colombia, which occasionally feeds on snakes, and breeds in Woodpeckers' holes, has two sub-species, *T. cinnamominus* of Central and South America and *T. caribbaearum* of the Antilles. *T. dominiecnsis* (*sparverioïdes*) inhabits Cuba and St. Domingo, and occurs in Florida; *T. isabellinus* ranges from Georgia to northern South America; *T. alopex* from Nubia to Bogos-Land; *T. rupicolus* and the more northern *T. rupicoloïdes* occupy South Africa; *T. gracilis* the Seychelles; *T. punetatus* Mauritius; *T. newtoni* Madagascar; *T. moluccensis* the Moluccas and the Sunda Islands; *T. cenchroïdes* Australia and Tasmania. It is remarkable that no Kestrel inhabits Jamaica or Bourbon, though Cuba and Mauritius are respectively so near them.

Erythropus vespertinus, the Red-footed Falcon, which wanders to Britain, but breeds from Eastern Europe and Algeria to Krasnoiarsk, where it meets the Eastern Asiatic *E. amurensis*, is lead-grey in the male, with browner tail, chestnut thighs and vent region; the female being barred with blackish above, and having the head, nape, and under surface rufous. The cere, orbits, and feet are red. Both forms migrate to South Africa, keeping more to the west and east respectively; the latter, which crosses India and Burma, being distinguished in the male by white under wing-coverts, and in the female by the absence of rufous on the head, neck, and brown-spotted breast. In general habits like Kestrels, these birds are more gregarious, and breed in company.

Hypotriorchis subbuteo, the Hobby, nests sporadically in England, and extends thence to North Africa and Japan, occurring in the Canaries and migrating to South Africa, North India, and China. Both sexes are slate-coloured, having buff lower parts with black streaks, reddish vent, white throat and sides of the neck, and a black stripe down the latter. This bold and dashing little Falcon, easily recognisable by the extremely long wings, which give it a Swift-like appearance, is usually seen poised aloft, or rapidly pursuing the insects and birds which form its food. The note is shrill; the three to five eggs resemble closely freckled pinkish specimens of those of the Kestrel, and are

deposited late in the season in disused birds' nests. The statement that it broods on the eggs of the Kestrel needs further proof. *H. eleonorae*, the largest Old World species of the genus, occupying the Mediterranean basin from Spain and the Atlas to the Levant, while straying to Mauritius, is uniform sooty-black; but some individuals never become sooty, and immature examples precisely resemble the Hobby. The habits are like those of its congener, but the two or three eggs are larger, and are laid in holes in cliffs, or upon the bare soil on stony flats of desolate islands. The very similar *H. concolor* ranges from the Red Sea to Madagascar; *H. cuvieri* inhabits the Ethiopian Region; *H. ophryophanes* is described from Colonia; *H. severus* extends from India and Ceylon to New Britain, but not to Australia; *H. lunulatus* from Flores to the Duke of York Island, with Australia and Tasmania; *H. fusco-caerulescens* and *H. ruficularis* from Mexico to Argentina, the former moreover reaching the southern United States and Patagonia. The powerful *H. diroleucus*—perhaps referable to the genus *Falco*—occurs from South Mexico to Peru and Brazil.

Aesalon regulus, the Merlin, called the Stone-Falcon from its habit of perching on rocks, is a lively and interesting little species, daring yet confiding, which preys chiefly upon small birds, and flies less swiftly than the Hobby, though both are used for Lark-hawking. The shrill note is chiefly heard at the breeding-quarters, which in Britain are generally on steep hill-slopes, especially where stony outcrops break the heather or grass; from four to six eggs—duller and less blotched than those of the Kestrel, being deposited in a hole scraped in the bare ground. Abroad—and exceptionally in Scotland—old nests in trees or rocky ledges are utilized, and the bird is perhaps occasionally its own architect. Fairly common north of Derbyshire its summer range extends over the moorlands from Shetland to Devonshire, and includes Ireland, while it visits the sea-coast in autumn. It occurs accidentally in Greenland, and reaches thence to the Pyrenees and the Alps, being found across Northern and Central Europe and Asia, and migrating to North Africa, North India, and South China. The male is slaty-blue with rusty nape and under surface, and is streaked with dusky throughout; the throat is white, as is the tip of the tail, which, besides six imperfect bars, shows a broad sub-terminal black band. The dark brown female has the lower parts white, the rectrices exhibiting eight light

bars. In the very similar *Ac. columbarius*, the "Pigeon Hawk" of North America, extending to Venezuela and Ecuador, the tail-bars in the respective sexes are four and six. This species and the following usually build in trees, using twigs, roots, grass, and moss for their nests. *Ac.* (*Chicquera*) *typus*, the Indian "Turumti," is a larger bird, both male and female being grey above and white below, with red head and dark barring nearly throughout, while the Ethiopian *Ac.* (*C.*) *ruficollis* is slightly less striped.

The most typical member of the Family is *Falco peregrinus* the almost cosmopolitan Peregrine Falcon, of which the sub-species *F. melanogenys* and *F. ernesti*, the commonest forms from the Sunda Islands to China and Fiji, are more closely barred below, though not so broadly as *F. cassini* of the extreme south of America. The colour is slaty-grey above with darker transverse markings, the head and a stripe down each side of the neck being blackish, and the under parts ruddy-white banded with black. Young birds are browner, and are streaked instead of barred. Barely separable is the smaller and darker *F. minor* of South Africa, the Comoro Islands, and Madagascar, with its larger race *F. punicus*, found from Morocco along both sides of the Mediterranean to Asia Minor. *F. barbarus*, also of the Mediterranean region, but chiefly confined to Africa north of the Niger, and the Soudan, is distinguished by its red nape, brightest in the larger sub-species, *F. babylonicus*, which occurs from Babylonia to North India. The Peregrine Falcon, often erroneously called "Goshawk" in Scotland—a fact accounting for many British records of the latter—is for its size the most powerful of the Family; and, being one of the "noble" or long-winged forms, is much used in Falconry, wherein the male is termed "Tiercel" and the female "Falcon," as in many other species; while "Hunting Hawk," "Blue Hawk," and, for the young, "Red Hawk," are names common to both sexes.

Far the most daring of our Birds of prey, the fierceness and courage are especially shewn in defence of its nestlings, both parents dashing angrily at an intruder, and, though rarely touching him, swooping down in unpleasant proximity, as he clambers along some narrow ledge or swings upon his rope. Should, however, the hen-bird, which sits very closely, have fresh eggs, she disappears on leaving them, though her consort flies wildly to and fro at some little distance, reiterating his shrill cry. Exceptionally

savage adults may even strike the person; nevertheless, Skuas and certain Owls are decidedly more dangerous, whereas the ordinary Eagle is mild in comparison. The food consists of ducks, guillemots, pigeons, grouse, and partridges, varied by rabbits and so forth; yet, in spite of the undoubted damage caused to game, preservers would be wise to spare a due proportion of individuals in view of their utility in killing off the more weakly and diseased birds. The two to four eggs, usually finely blotched or thickly mottled with rich red on a creamy ground—though one is often paler or yellowish—are deposited in a hollow scraped on some bare or grassy ledge of a sea-girt or inland cliff; but occasionally nests in trees are utilized, or broken ground in northern regions. Two or more sites are often tenanted in turn. Long distances are traversed in search of food, the survivor of a pair mating again marvellously quickly, considering the comparatively scanty supply of partners.

F. peregrinator (*atriceps*), the Shaheen or Royal Falcon, of India, Ceylon, and Tenasserim, distinguishable by the deep ferruginous under surface and the general absence of barring, is much prized by natives for hawking, as is the docile but delicate and less courageous Lanner (*F. feldeggi* or *tanypterus*) by the Bedouins. The latter is buffish-brown, with ruddy crown and nape, a grey tinge towards the rufous-barred tail, and fawn-coloured lower parts with brown spots; it ranges from Loango and Unyamuesi in Africa as far as South Europe and Persia, and lays four eggs—lighter than those of the Peregrine—in rocks, ruins, or disused birds' nests, the Dashoor Pyramid being a well-known site. *F. biarmicus*, a close ally from South Africa, is nearly spotless below.

Of the genus *Gennaea* or "Desert Falcon," *G. sacer* (*lanarius* or *milvipes*), the Saker, found from North Africa and East Europe to North China, has brown upper parts mottled with fulvous, whitish crown, nape, and lower surface streaked with brown, and white markings across the tail. A swift and fairly bold denizen of open country, it is used for bustard- gazelle- or heron-hawking by Indians and Arabs, while it also preys on hares, birds, and lizards. It deposits three or four rather pointed white eggs, blotched or spotted with various shades of red, in a nest of sticks and grass, normally placed in a tree. *G. jugger*, the Luggur of India and Afghanistan, differs in being greyer above and less streaked below, with rufous crown and nearly uniform tail, whereas *G. mexicana* (*polyagrus*), the Prairie

Falcon of Mexico and the western United States, has the head brown. *G. hypoleuca*, of Australia, is grey and black, with barred tail, and dusky shaft-streaks on the whitish lower parts; *G. subnigra* of the same country being almost plain blackish-brown.

Much controversy has arisen concerning the noble Arctic Falcons (*Hierofalco*), especially those occupying Siberia and Northern America; it seems, however, most probable that three grey forms inhabit the latter and two the former region. In *H. candicans*, the Greenland Falcon, the prevailing colour is white at all ages, transversely marked above and spotted below with blackish; it occurs in North Greenland, Spitsbergen, Arctic Siberia and America, the Commander Islands, and Amur-land. *H. gyrfalco*, the Gyr- or Jer-Falcon [1] of Arctic America, Greenland, Scandinavia, Northern Russia, and possibly North Asia, is like a large Peregrine Falcon, but is greyer above and whiter below; *H. islandus*, the Iceland Falcon, of South Greenland, Iceland, North Siberia, and Arctic America is paler, having the whitish head streaked with dusky. *H. labradorus*, of Labrador, is dark throughout. All these species move southwards towards winter, the first three visiting Britain and the Greenland Falcon even Southern France. They are still valued in Falconry; but, though more powerful, they lack the spirit and dash of the Peregrine Falcon. The food consists of lemmings, grouse, sea-fowl, and the like; the nest of sticks, lined with softer materials, is placed on rocks or trees, and contains three or four whitish eggs mottled or completely covered with yellowish or cinnamon markings.

Fam. V. **Pandionidae**.—This group is especially remarkable for the reversible outer toe—recalling that of the Owls, the want of an aftershaft, and the long closely-feathered tibiae. The strong short beak is arched and decidedly hooked; the powerful feet are roughly scaled; the toes nearly equal, with no connecting membranes, but with spicules beneath; the claws sharp, curved, and rounded. The wings are long; the tail is comparatively short. The other structural details are as in the Falconidae. The downy young are dusky, varied with rufous; the lower breast, the abdomen, a central stripe down the back, and several on the head, being white.

Pandion haliaëtus, the Osprey or Fish-Hawk, nearly cosmo-

[1] Professor Newton and other writers seem to consider that the true Gyr-Falcon only *inhabits* Scandinavia and *H. candicans* Greenland and Arctic America; but this does not preclude occurrences elsewhere. Cf. however, *Ibis*, 1889, pp. 143-144.

politan in range, though local everywhere, and absent from many of the Pacific Islands, New Zealand, Iceland, Greenland, and America south of Brazil, is dark brown above, with the short crest, head, nape, and lower parts white; the crown being streaked with blackish, and a brown band—which becomes in the male a series of spots—crossing the chest. The bill is dusky, the cere and feet are bluish, and the irides yellow. The smaller Australasian *P. leucocephalus* and the American *P. carolinensis* barely attain subspecific rank. A migrant to Britain, this bird formerly bred at Ulleswater, and not uncommonly in Scotland, where two or three pairs still remain. Of old it often occupied rocky islets or ruins in Highland lochs, but the nest is usually placed in other countries on trees or sea-cliffs, and exceptionally on the ground; trees being the favourite site in America, in which country colonies are sometimes formed, consisting of even three hundred pairs. The bulky flattish pile of sticks and turf, lined with moss, grass, or seaweed, is invariably placed near water, and contains three, or rarely four, whitish eggs, beautifully blotched or overspread with dark brown, crimson, or claret-colour, varied with orange, buff or grey, New World specimens being usually duller. Surface-swimming fish form the food, and magnificent indeed is the spectacle when an Osprey, after poising itself vertically aloft, descends with terrific dash and splashing plunge to rise again with its captured prey grasped in its roughened toes. The graceful flight is varied by many evolutions and spiral ascents, while the loud piercing scream is chiefly heard at the nesting-quarters.

Of fossil Falconine forms, excluding existing species, *Lithornis vulturinus* is found in the London Clay (Lower Eocene); from the Upper Eocene of France comes *Palaeocercus curieri* and *Falco*—the former possibly from England also; from the Lower Miocene of France *Teracus littoralis*, *Palaeohierax gervaisi*, *Aquila*, *Buteo*, and *Milvus*; from its Middle Miocene *Haliaëtus* and *Aquila*. *Aquila* also occurs in the American Pliocene of Nebraska and Oregon: *Falco* in the Italian; from the drifts of Queensland we have *Necrastur alacer* and *Taphaëtus branchialis*; from the Argentine Pampean of Lujan and the Post-Pampean of Monte Hermoso respectively *Asthenopterus minutus* and *Foctopterus ambiguus*; while the superficial deposits and swamps of New Zealand furnish a subfossil *Circus* and the giant *Harpagornis moorii*; and the Mare aux Songes of Mauritius *Astur alphonsi*.

CHAPTER V

NEORNITHES CARINATAE *CONTINUED*

BRIGADE II—LEGION I (ALECTOROMORPHAE). ORDERS: TINAMIFORMES—GALLIFORMES—GRUIFORMES—CHARADRIIFORMES

Order VIII. TINAMIFORMES.

THE primitive Neotropical Order Tinamiformes, with the Sub-Order TINAMI, and sole Family **Tinamidae** or **Crypturidae,** is classed here in accordance with Dr. Gadow's carefully-weighed decision;[1] yet the position must not be considered absolutely certain, most systematists placing it near the Ratitae. The complete fusion of vomer and palatine bones is unique among Birds, though partially noticeable in *Dromaeus* and *Apteryx;* the conformation of the skull, the single head of the quadrate, the separation of the ischium and ilium, the absence of a pygostyle, the reduced tongue, the functionless tail, the gait and bearing are Struthionine features; but other points of structure, the pterylosis and the habits generally, are Galline.

The furcula is U-shaped; the sternum long and slender with well-developed keel; the head small; the neck thin and elongated with short plumage; the beak fairly strong, varying in length, and composed of more than one piece, the culmen being flattened and usually arched; the moderate metatarsus is transversely or hexagonally scutellated, and may be rough or smooth behind, while the hallux—wanting in *Calopezus* and *Tinamotis*—is elevated, and the anterior toes are long or short, with moderate claws. The short wings are concave and rounded, with ten primaries and from thirteen to sixteen secondaries; the

[1] Cf. H. Gadow, Bronn's *Thier-Reich, Aves, Syst. Theil.* 1893, pp. 160-164.

abbreviated tail possesses ten very weak feathers, hidden by the coverts in *Tinamus*, *Nothocercus*, and *Crypturus*, and hardly distinguishable from them in *Rhynchotus*, *Nothoprocta*, and *Nothura*, the coverts themselves almost forming a train in the male of *Taoniscus*. *Calodromas* has twelve rectrices. The tongue is small and triangular, the crop is large and globular, the after-shaft may be rudimentary or wanting; powder-down feathers occur near the rump, and the down of the adults is sparing, while that of the nestlings,[1] which run from the shell, may be simple or complex, and is of a buffish-brown or chestnut colour, often relieved by black markings and white streaks.

Like Partridges in appearance, and varying from the size of a large Fowl to that of a Quail, Tinamous are essentially ground-birds, and rarely perch, some species being solitary and others forming coveys; they haunt the undergrowth of thick forests, dry bushy and grassy flats, or—exceptionally—rocky mountains. The flight is strong and extremely swift, accompanied by quick vibrations of the wings, occasionally varied by a gliding motion; so reckless moreover is the pace that individuals are frequently killed by striking against the first obstacle they meet on rising. To flush them, however, is often a vain attempt, as they run with amazing rapidity, and are readily concealed by the surrounding vegetation. The voice—a trill or mellow whistle of several notes—differs somewhat according to the species, and may be heard even in winter; the food consists of seeds, berries, roots, bulbs, spiders, insects and their larvae, maize- and potato-crops being at times seriously damaged. A hole is scraped under shelter of a tussock or bush, and scantily lined with dry leaves or herbage, to receive the eggs, deposited in some districts almost throughout the year: these are oval, and so wonderfully burnished as to be totally unlike those of any other bird. They vary, according to the species, from reddish-chocolate, wine-purple, or liver-colour to dark blue, bluish-green or primrose, and number from four or five to sixteen; though the smaller figures are perhaps the most reliable, as larger sets, though not uncommon, may be the produce of more than one hen. As in the Turnicidae, and to some extent in the Ratitae, the male alone incubates, sitting about three weeks, and feigning disablement to decoy intruders from the nest. The flesh is very delicate. The birds dust themselves daily.

[1] Cf. W. P. Pycraft, *Ibis*, 1895, pp. 1, 507.

As will be seen from the following examples, the general coloration is rufous or slaty-brown, which may be relieved by buff, or barred with blackish above and even below; the under parts being often greyer, with whitish throat and belly. The sexes do not differ greatly, but the female is, if anything, the larger bird. Some six forms occur in Mexico, while of the remainder *Tinamotis ingoufi* extends the range to Southern Patagonia.

The genus *Tinamus* has ten members, *T. tao*, of South America north of Bolivia and Brazil, being greyish-olive, with slaty breast and buff abdomen, wavy blackish markings on both surfaces, black primaries, black head and neck with white spots and bands on the sides, and still whiter throat. Of the thirty or more species of *Crypturus*, *C. tataupa*, extending from Peru and Bolivia to Brazil and Argentina, is plain chestnut-brown, with blackish crown, grey cheeks, neck, and breast, whitish throat and belly, buffish flanks with black crescentic bars, red beak, and pinkish feet. It haunts dense undergrowth in forests, even near habitations, and frequently sits bent forward with its "tail" expanded over its back; its melody consists of several notes at diminishing intervals, merging into a hurried trill, which is terminated by a reiterated sound like "chororó"; its eggs are of a reddish chocolate-colour. *Rhynchotus rufescens* of the same countries except Peru, the "Perdiz grande" of Argentina, which is represented in Bolivia by the similar *R. maculicollis*, is grey-brown, with blacker crown, rufous cheeks, neck, and breast, and chestnut primaries; the back being barred with whitish and black, and the flanks with brown and white. This somewhat solitary bird threads

FIG. 42.—Great Tinamou. *Rhynchotus rufescens.* $\times \frac{1}{5}$

the tall grasses of the Pampas like a Rail, and, if unable to escape by squatting or running, will fly for some thousand yards, and thrice repeat the effort before becoming exhausted, the rapid whirring of the pinions sounding like a vehicle driven quickly over stones. The song, as it may almost be called, consists of five or six flute-like notes, several individuals sometimes joining in chorus towards evening, when they are decidedly active. The eggs, which are dark purple, have been hatched in confinement, and attempts at naturalization have been made in Essex and Herts. *Nothoprocta* contains eight members, *N. pentlandi* of the Bolivian and Argentine Andes having the crown and back grey, barred with black and buff, and streaked with white, the remiges blackish and buff, the cheeks and breast grey, the throat, mid-abdomen and pectoral spots whitish, the flanks grey, black and white. Its powers of flying and running are comparatively small, and it will remain stationary for hours among stones or bushes in ravines, escaping observation by its dull hue. The note is a full-toned whistle; the food consists of seeds, fruits, and insects; the eggs are reddish-brown. Of seven species of *Nothura*, *N. maculosa*, the "Perdiz comun," found from South Brazil to Argentina, is yellowish-brown above, barred with black and streaked with whitish, the throat being white, the wings marked with fulvous, and the lower parts rusty with brown breast-spots and curved flank-bands. It is a fearless, solitary, and somewhat sluggish denizen of grassy plains, which does not avoid habitations, and may be knocked down with a whip or stone, feigning death when captured; the note resembles that of *Crypturus tataupa* without the final intonation; the eggs are wine-purple or liver-coloured. *N. darwini*, the shy "Perdiz chico" of Patagonia, is greyer. *Calodromas* (*Calopezus*) *elegans*, the Martineta, ranging from South Uruguay to Patagonia, has a grey and black head and neck with long recurved crest, elevated in excitement, two white bands on each side of the head, rufous and black upper parts, whitish throat and marks on the primaries, and buffish under surface with crescentic black bars and spots. It frequents dry bushy table-lands, often in coveys of twenty or thirty, which run squealing in single file before intruders, and utter, in summer only, a long plaintive whistle, or chorus of notes like those of *Rhynchotus*, but weaker. The flight, accompanied by a wailing sound, is broken by intervals of gliding; the four to sixteen eggs are deep green or yellowish.

The remaining genera are *Nothocercus* with five, *Taoniscus* with one, and *Tinamotis* with two species.

Order IX. GALLIFORMES.

The Galliformes, or Gallinaceous Birds, constitute a large and fairly homogeneous Order, situated between the Tinamiformes and the Gruiformes, if we assume the former to be classified in accordance with the views of Dr. Gadow, and not to be placed nearer to the Ratitae; the Gruiformes again linking themselves to the Laro-Limicoline section of the Charadriiformes, and so forth. *Opisthocomus*, however, though decidedly Galline, shows considerable resemblance to the Cuckoo-tribe.[1] The present Order may be divided into the Sub-Orders MESITAE, with the Family *Mesitidae;* TURNICES, with the *Turnicidae* or Button-Quails, and the *Pedionomidae;* GALLI, with the *Megapodiidae* or Mound-builders, the *Cracidae* or Curassows, and the *Phasianidae* or Game-birds, Fowls, and the like; and finally OPISTHOCOMI, with the Family *Opisthocomidae*, containing but one species, the exceptionally curious Hoatzin. Among the *Galli*, the *Megapodiidae* and *Cracidae* together compose Professor Huxley's group of Peristeropodes or Pigeon-footed forms, where all the toes are in one plane; the *Phasianidae* standing alone in his Alectoropodes, or Fowl-footed division, where the hallux is elevated above its fellows.

Excluding *Mesites*, of which comparatively little is known, all the members of the Order agree in having a more or less globular crop, and a somewhat scanty supply of down in the adults, with a more uniform coating in the young, which becomes thinner in *Opisthocomus;* they may be distinguished from the Gruiformes, except *Rhinochetus*, by their impervious nostrils, while the Tinamiformes differ in the compound structure of their bills, the primitive sternum, and the invariably weak rectrices.

Sub-Order MESITAE. Fam. I. **Mesitidae**.—This consists of a single genus, *Mesites*, from Madagascar, originally referred by Isidore Geoffroy Saint-Hilaire to the neighbourhood of the Pigeons, and by subsequent writers to that of the Passerine, Ardeine, or Ralline birds.[2] W. A. Forbes[3] classed it next to *Eurypyga* and

[1] H. Gadow, Bronn's *Thier-Reich*, *Aves*, *Syst. Theil*, 1893, p. 176.
[2] A. Milne-Edwards, *Ann. Sci. Nat.* (6) *Zool.* vii. 1878, Art. 6.
[3] *P.Z.S.* 1882, pp. 267-271.

Rhinochetus; but Dr. Gadow, as may be seen from above, places it in the Galliformes, considering it to be a connecting link between that Order, the Tinamiformes, and the Gruiformes.

In this curious form the bill is long and slender; the legs are rather weak, with the uniformly scutellated metatarsus shorter than the partially bare tibia; while the toes, which are without webs, are on the same level. The keel of the sternum is short, the anterior extremity hardly reaching beyond the middle of the breast-bone, and the clavicles are quite rudimentary. The wing is rounded, and has ten primaries and six secondaries; the tail is strong and well-developed, with fourteen (or sixteen) rectrices. Mr. E. Bartlett tells us that the quills of the soft feathers of the back and rump are so delicate that the plumage curls forward immediately upon the bird's death.[1] The after-shaft is absent, the pervious nostrils are long and linear, the lores and bluish orbits are naked. No less than five pairs of powder-down patches have been ascertained to exist, of which two couples are dorsal, one adjoins the upper pectoral muscles, and two are ventral. *M. variegatus* is cinnamon, with black and tawny markings, the lower parts being white with black spots and reddish flanks. The female is mostly rufous below. *M. unicolor* is not distinct. Hardly anything is known of the habits, but the nest is said to be upon the ground.

Sub-Order TURNICES.—This consists of the two Families, *Turnicidae* and *Pedionomidae*, each with one genus, *Turnix* or *Hemipodius*, and *Pedionomus* respectively; the last-named, moreover, has but one species. *Ortyxelus meiffreni* (p. 295), may belong here.

Fam. II. **Turnicidae.**—In this group the bill is short, but commonly less stout than that of the *Phasianidae*, which it otherwise resembles; the metatarsus is long, slender, and scutellated, the hallux is absent, the claws are small, curved, and sharp. The wings are broad and rather short, with ten primaries and about fifteen secondaries; the abbreviated tail contains twelve soft rectrices, which are not so long as the upper coverts in *Turnix ocellata*, while in *T. sylvatica* and several nearly-allied species the median feathers are somewhat elongated and acute. The furcula is U-shaped, and the crop is almost absent, but an after-shaft is present; the pointed tongue, the impervious nostrils, and the tracheo-bronchial syrinx calling for no special remark. Where the sexes

[1] *P.Z.S.* 1877, p. 292.

differ, the female is almost always the larger and brighter-plumaged bird, the colours being black, brown, buff, chestnut, and white in varying admixture, and becoming less distinct with age.

These small, solitary, and non-migratory forms often escape observation through their shyness, as they run strongly, and are flushed with the greatest difficulty, dropping quickly into cover after a short awkward flight; they frequent dry, grassy plains and localities covered with low trees or dense bushes, and utter a pleasant ringing or triple grating cry, with a mournful call-note at dawn and sunset.[1] The food consists of seeds and insect-larvae; the well-concealed nest is little more than a hole lined with dry grass, though sometimes domed with similar materials; the three to five eggs, shaped somewhat like peg-tops, are buff or greyish, with spots of pale grey, purplish, or dark brown. Two broods are raised in a season, and it is a noticeable fact that the comparatively dull-hued male performs all, or nearly all, the duties of incubation, sitting very closely, and feigning lameness when surprised with the young, which run from the shell. The adults frequently fight, but the sex of the combatants is uncertain.

The genus *Turnix* includes some twenty "Hemipodes," the Bustard- or Button-Quails of Anglo-Indians, which range from South Europe, Arabia, and Africa to India, China, the Liu-Kiu Islands, and Formosa, as well as to Australia, New Britain, and New Caledonia. The female is described below, unless otherwise stated. *T. taigoor,* reaching from India, Ceylon, and the Malay Peninsula to the Liu-Kiu Islands and Formosa, is brown above, with black bars and vermiculations, and buff margins to many of the feathers; the forehead and sides of the head and neck are white spotted with black, the mid-throat and chest are black, a whitish stripe divides the crown, and the under parts are buff, banded with black on the sides of the chest and on the breast. The whole chest is barred in the male, the centre of the throat being white. Darker birds apparently inhabit wetter districts.[2] *T. pugnax* of Ceylon and the Great Sunda Islands is a rufous-naped race. *T. fasciata,* with a rufous collar, but grey and black upper surface, inhabits the Philippines and Paláwan; *T. rufilata,* of Celebes, has the throat barred with black,

[1] *Turnix sylvatica* is called "Torillo" in Spain from its note, which resembles the subdued bellowing of a bull.

[2] For the entire genus see Ogilvie Grant, *Ibis*, 1889, pp. 446-475.

and a rufous vent-region, *T. powelli* of the Lesser Sunda Islands being similar. The males lack the rufous collar and barred throat. *T. sylvatica*, of South Europe and Africa generally, has in both sexes dull reddish upper parts, barred with black and relieved by white, grey, and buff, which cause a scaly appearance: the browner wings shew white spots, the centre of the crown and throat are white, the sides of the head, neck, and breast whitish with black spots, the mid-chest and abdomen ruddy and buff respectively. *T. dussumieri*, the smallest species known, occurring in India, Pegu, Hainan, and Formosa, differs in the wide yellowish margins of the scapulars, a feature found also in the blacker *T. nana* and *T. hottentotta* of Africa, wherein the sides are barred. The former ranges from lat. 10° S. to the Great Karroo, and the latter southward of that district. *T. blanfordi* is found east of the Bay of Bengal to Siam and Manchuria, *T. tanki* in India and eastward to Tipperah, *T. albiventris* in the Andamans and Nicobars; all being greyish above varied with black, and having the nape rufous in the female only. *T. maculosa* of Celebes, Southern New Guinea, and Australia, and *T. saturata* of New Britain and the Duke of York group are similar, but exhibit yellow-edged scapulars; the latter possessing no rusty collar, but having a white throat in the male. *T. ocellata* of Luzon is a large greenish-brown species vermiculated with black, in which the neck and breast are bright ruddy, the crown is blackish banded with white, the throat and cheeks are chiefly black, and the wing-coverts show black ocelli with whitish margins. The male has the middle of the throat white and no rufous collar. *T. nigricollis* of Madagascar is grey, black, reddish, and buff above, with much black and white on the head; and is uniform grey below, with black mid-throat and more or less ruddy sides. The throat is white in the male. The female of *T. melanogaster* of East Australia has both throat and breast black, with white markings on the latter, the male reversing the colours. Other Australian forms are *T. varia*, with chestnut nuchal collar, black, white, and rufous upper, and grey and buff under parts; *T. castanonota*, with vinous red upper surface; *T. pyrrhothorax*, chiefly greyish above and rusty buff below; and *T. velox*, reddish-chestnut in colour with nearly white lower parts. In these four the sexes are alike. *T. leucogaster* inhabits Central Australia.

Fam. III. **Pedionomidae.**—*Pedionomus torquatus* differs in

structure from *Turnix* by the presence of a small hind-toe. The lax upper plumage is, in the female, reddish-brown with black barring and buff margins to the feathers, the lower parts being pale buff marked with black. A broad white collar spotted with black surrounds the neck, while a rust-coloured nape and

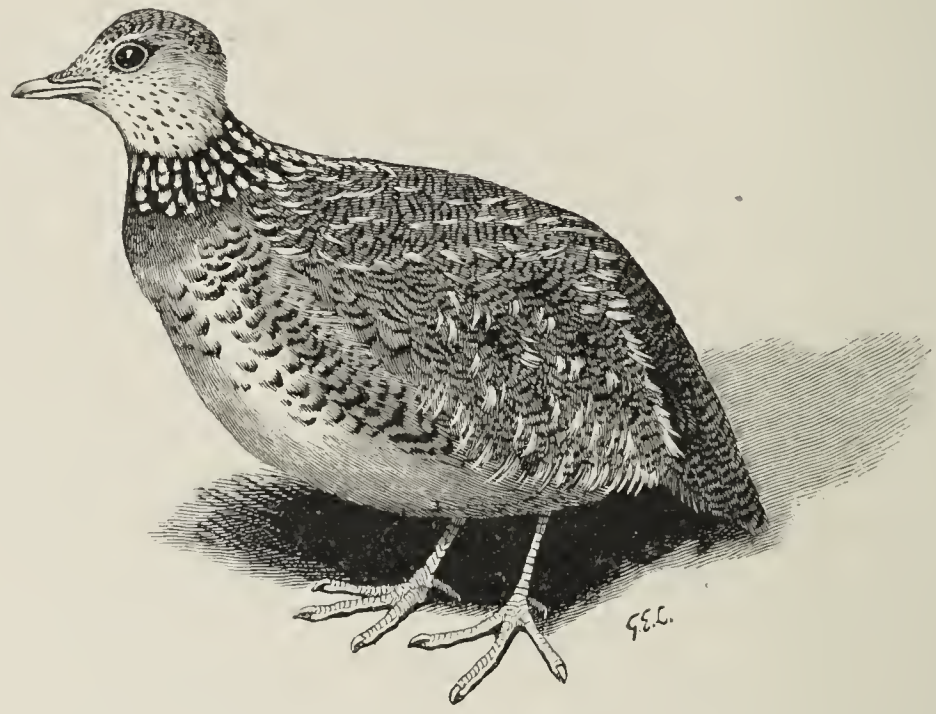

FIG. 43.—"Plain-Wanderer." *Pedionomus torquatus.* $\times \frac{1}{2}$.

chest distinguish the above sex from the male, where the collar is brown and buff. This curious bird, somewhat smaller than a Quail, inhabits grassy plains in Southern and Eastern Australia, preferring the wilder districts. The habits are much as in *Turnix*, but the nest seems never to be domed, the four eggs being of a light stone-colour, thickly freckled and blotched with brown and grey.

Fam. IV. **Megapodiidae.**—The Megapodes, or Mound-builders, commence the section Peristeropodes (p. 186) of the Sub-Order GALLI. The bill is short, stout, and arched, though rather slender in *Megapodius;* the feet are exceptionally strong, and enormous for the size of the birds, *Lipoa* having the smallest; while the metatarsi are usually scutellated, but are reticulated anteriorly in *Megacephalon*, which has comparatively short and blunt claws. The abbreviated wings have ten primaries and some six secondaries. The tail is long and rounded in *Talegallus* and *Lipoa*, with upper coverts extending to the tip in the latter; it is short but still rounded in *Megapodius;* long and obcordate when expanded in *Catheturus*, *Aepypodius*, and *Megacephalon*. The rectrices number twelve in *Megapodius*, sixteen in *Lipoa*, *Tale-*

gallus, and *Aepypodius*, eighteen in *Megacephalon* and *Catheturus*. *Aepypodius* possesses an erect fleshy frontal crest and a pendent caruncle at the base of the fore-neck, or even a pair of lateral outgrowths near the nape; *Catheturus* has a vascular neck-wattle: and *Megacephalon* a rounded bony casque with a tubercle behind each nostril. The fleshy growths are yellow or reddish, the horny black. In *Aepypodius*, *Catheturus*, and *Megacephalon* the naked head is clothed with hair-like feathers or papillae; *Lipoa* and some species of *Megapodius* have a short dense crest; others have the head almost entirely feathered, others again nearly bare except the occipital and nuchal region, as in *Talegallus*. The naked skin may be red, yellow, orange, purplish, grey, or pale blue; the bill and feet are black, brown, olive, yellow, red, orange, horn- or parti-coloured. The furcula is Y-shaped, the syrinx tracheo-bronchial, the tongue sagittate, the gizzard muscular, and the aftershaft small. The size varies from that of a Turkey to that of a large Pigeon, the sexes being invariably similar.

Megapodes are shy terrestrial birds found in hill-valleys, among thickets near rivers or the sea, or on gravelly and sandy beaches. Upon the ground their gait is not ungraceful, while they run well, and only take to the wing when hard pressed; if disturbed they usually seek the lowest branches of the neighbouring trees, hopping gradually to the higher limbs; the flight is heavy, but can carry them from island to island. Always difficult of observation they are rarely seen in company, yet the larger breeding mounds are no doubt used by more pairs than one. Hoarse croaks or clucks are uttered in the day-time, mewing notes or noisy cackles at night; the food consists of fallen fruit, seeds, berries, worms, snails, insects, and even crabs. The brownish-red, salmon-coloured or whitish eggs, at least as large as those of the domestic duck, are deposited either in mounds constructed of soil and vegetable matter, or in holes made in sandy or shingly ground; the decaying vegetation or the sun's heat producing the effect of an artificial incubator, and making parental aid needless. The young extricate themselves readily from the superincumbent soil, being hatched in a feathered condition, and flying almost immediately. The flesh is dark and usually unpalatable.

Though mainly confined to the Australian Region, where it extends eastwards to Ninafou and Samoa, the Family reaches westward to the Nicobars, and northward to the Philippines and

Ladrones, replacing the Pheasants within these limits—save for the Philippines—just as the Cracidae do in Neotropical countries. No species is yet recorded from Sumatra or Java, and confirmation is needed in the case of the main island of Borneo.

Megacephalon maleo of North Celebes and the Sanghir Islands is glossy blackish-brown, with salmon-pink breast and belly, a vaulted tail, a black casque of cellular tissue, and dusky bill and feet. The Maleo, as it is called, inhabits hilly country, but resorts in hundreds to sloping gravelly beaches to breed, holes being scratched or dug just above high-water mark, some four or five feet in diameter. In these from two to eight pale brownish-red eggs are laid, about six inches apart—at intervals, it is said, of a fortnight or so—several females occasionally using one cavity.

Aepypodius bruijni of Waigiou is brownish-black, with chestnut rump and breast, dusky bill and feet; a fleshy papillose crest adorns the head, and three wattles—one median and two lateral—occur on the neck, all probably red in life. *Ae. arfakianus* of New Guinea is black above and brownish below, with no lateral wattles.

Catheturus lathami, the "Brush Turkey" of Eastern Australia, is blackish-brown with greyish under surface, shewing conspicuous light margins to the feathers. It has a bright yellow neck-wattle, reddish head and neck, black bill and brown feet. This species forms mounds of earth and decayed leaves, sometimes as much as six feet high and fourteen feet in diameter at the base, and covers the coarse outer layers with fresh leaves and sticks. The central portion is hollowed out like a cup, successive layers of eggs being deposited from the circumference inwards in concentric circles, and the earth gradually filled in above them. Several females sometimes utilize the same mound, each being said to lay an egg every second day. These eggs, placed with the small end downwards, number from twenty to nearly forty, and are of a long pointed oval shape and of a white colour with minute granulations. The site is usually a level clearing among scrub, whither the materials are conveyed by being repeatedly thrown backwards by the feet, while the cock possibly assists in building.[1] *Talegallus cuvieri*, of Western New Guinea, Salwatti, Mysol and Gilolo, is black with whitish throat; the naked parts are red-brown, the bill and feet

[1] This species has bred in the Zoological Society's Gardens, where the active young left the mound within twenty-four hours of being hatched. A. D. Bartlett, *P.Z.S.* 1860, pp. 426, 427. *C. purpureicollis* has been recently described from Cape York.

reddish-orange and yellow respectively. *T. fuscirostris*, of South and East New Guinea, with the Aru Islands, differs in its grey-black bare areas and brown bill; *T. jobiensis*, of Jobi Island and East New Guinea, has the bill, feet, and naked skin red. The habits resemble those of *Catheturus*: the mounds, which reach an internal temperature of 93° F., are sometimes eleven feet high; the eggs are reddish with a chalky incrustation.

Lipoa ocellata, the Native Pheasant or Mallee Hen of South and West Australia, has grey and brown upper parts, with black,

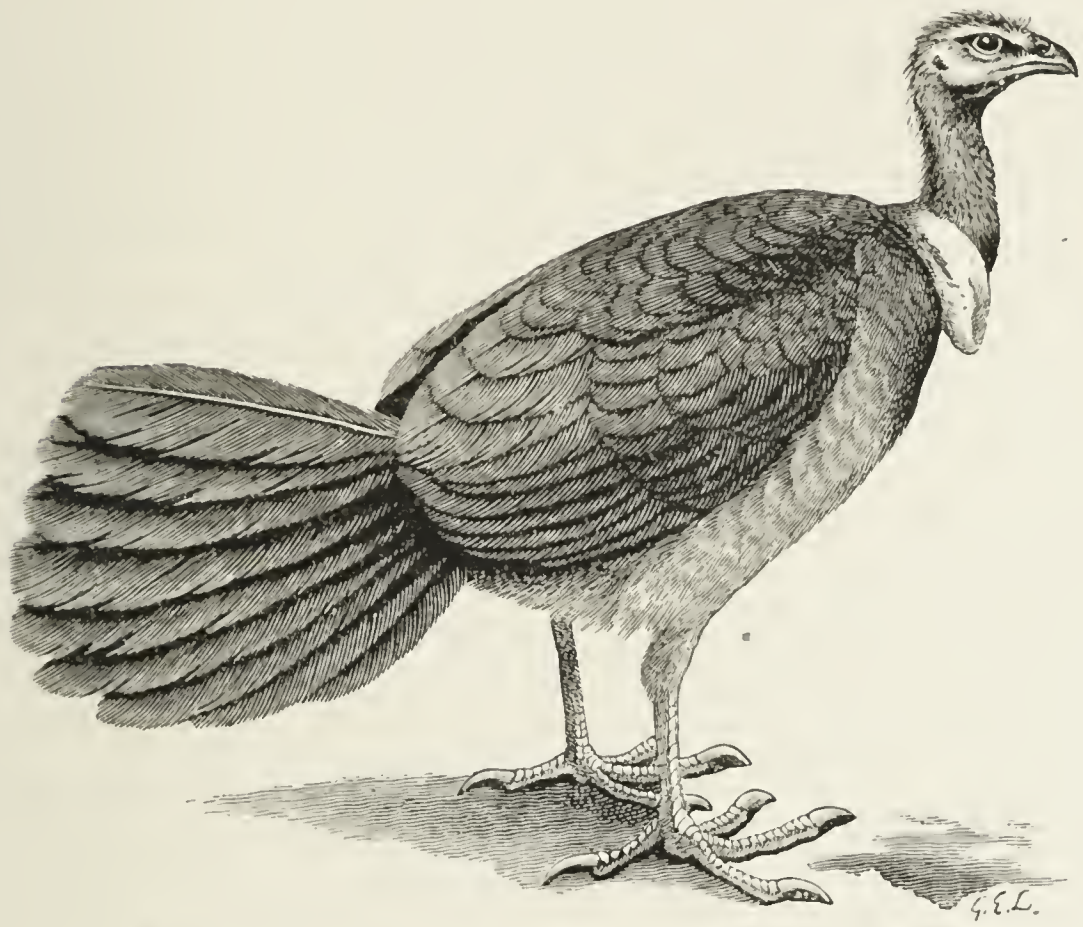

FIG. 44.—"Brush Turkey." *Catheturus lathami*. ×$\frac{1}{8}$.

buff, and white markings, which form eyes on the wings and back. The breast is grey with a median black and white line, the remaining lower parts being whitish with a rufous tinge. The naked parts are pale blue, the bill and feet brown. This bird frequents both open parts of the "brushes" and dense thickets, while in manners it differs but little from the members of the last two genera. The mounds—usually in close proximity—are, however, smaller as a rule, and are stated to be used by single hens, a fact no doubt true in many cases. The six to eight eggs, which are pinkish-white, but become red-brown in a few days, are very fragile, as in other Megapodes. The natives say that an egg is

deposited daily, the discrepancy between *Lipoa* and *Megaccphalon* being in this respect very remarkable, but conflicting assertions are only what may be expected where several females lay together, and further investigation should easily decide the question.

The genus *Megapodius* contains some fifteen species, about the size of a small fowl, in which the coloration varies from olive or chestnut-brown to blackish or grey above, and from red-brown to pale or dark-grey below, the bill being reddish, greenish, or yellowish, and the feet black, red, orange, yellow, or horn-coloured. *M. pritchardi*, of Ninafou, alone has white bases to the primaries, and *M. wallacii*, of the Moluccas, exhibits bright chestnut bands on the upper surface. *M. duperreyi* (*tumulus*), which ranges from the Kangeang Islands and Lombok to New Guinea and North-East Australia, fashions mounds, occasionally ten feet high, in dense scrub, laying pale coffee-coloured eggs in long burrows bored laterally, and not in symmetrical circles, as does *Catheturus*. *M. layardi*, of the New Hebrides, frequents damp wooded ravines, and is said to deposit its red-brown eggs among leaves in hollows. *M. cumingi*, found from the islands north of Borneo and Paláwan to the Philippines and Celebes, builds mounds of sand, leaves, and so forth, near the sea, the chalky eggs having a salmon hue. *M. eremita*, extending from the Solomon Islands almost to New Guinea, buries its eggs a couple of feet deep in open sandy spots, kept clear and fenced into allotments by the natives in Savo and Guadalcanar; while *M. nicobariensis*, of the Nicobars, appears to flock more than other Megapodes, and to lay its eggs at long intervals. *M. tenimberensis*, of the Tenimber Islands, *M. sanghirensis* of the Sanghir group, *M. bernsteini* of the Sula Islands, *M. forsteni* and *M. freycincti*, ranging from the Moluccas to Western or even Northern New Guinea, *M. macgillivrayi* of the Louisiade and D'Entrecasteaux Archipelagos and Eastern New Guinea, *M. geelvinkianus*, of the west of the latter with its islands, and *M. laperousii*, of the Pelew and Ladrone groups, are like their congeners in habits and appearance. *Chosornis praetcritus* is an extinct form from Queensland.

Fam. V. **Cracidae.**—These birds are almost identical in structure with the *Megapodiidae*, though sharply contrasted in their arboreal habits and their style of breeding. They may be divided into the Sub-families (1) *Cracinae* or Curassows, (2) *Penelopinae* or Guans, and (3) *Oreophasinae*. Of the first of these, where the maxilla is higher than it is broad, the genus *Crax* has a soft

cere, and nostrils in the middle of the bill, with the addition in many cases of frontal excrescences and wattles; *Nothoerax*, *Pauxis* and *Mitua* have the beak horny and the nostrils basal, *Pauxis*, moreover, being distinguished by a large knob on the forehead, and *Mitua* by its short, highly-compressed bill with swollen culmen. The remaining Sub-families have the maxilla depressed and broader than it is high; *Penelope*, *Penelopina* and *Pipile* exhibit bare throats with a median wattle, *Ortalis* a mere band of bristly-shafted feathers down the middle, and *Aburria* a feathered throat and vermiform wattle, while *Chamaepetes* shews neither wattle nor bare skin, and *Oreophasis*, the sole tenant of the *Oreophasinae*, a naked crown, surmounted by a cylindrical helmet. The males of *Crax*, *Pauxis*, and *Mitua*, and both sexes of *Penelope jacucaca*, have the trachea looped, and sometimes extended to the posterior end of the keel of the sternum; other forms lack the convolutions, but in several the state is unknown.

The range covers Central and South America, excluding the Greater Antilles, Chili and Patagonia, but one species (*Ortalis vetula*) even reaches as far north as Texas.

These handsome birds, from three feet to a foot and a half in length, frequent forests near the coast or wooded ravines on rivers, attaining at times an elevation of several thousand feet. They are often tame and show great curiosity, *Ortalis* being commonly gregarious and pugnacious; some forms, moreover, rarely seek the ground and are only to be seen perched among the branches, but others haunt the undergrowth in the mid-day heat, and *Nothoerax* is asserted to take refuge occasionally in hollow trees. The food consists of leaves and fruit, ordinarily procured in the morning or evening, while various species scratch among the débris like Pheasants. The flight is generally heavy and rapid, *Chamaepetes* in particular descending with a noisy rush and stiffened wings; the alarm-note is loud and harsh, and in *Penelope* cackling, but the more usual triple cry is clear and ringing, while *Ortalis* utters a softer call, and vociferates in rattling chorus. The carelessly-constructed nest of twigs, grass, moss, and leaves is of considerable size, and is placed on the horizontal branch of a tree, in a bush, or on a stump, the two to five eggs—smaller than those of a hen—being white, with a hard granulated shell. The young soon climb and hop about the boughs like the adults, of which the flesh is considered a delicacy. Several species are

readily domesticated, but rarely breed in confinement. Hybrids with domestic fowls have been recorded. Except where mentioned below the sexes are alike.

Sub-fam. 1. *Cracinae.*—*Crax alector* is black with a purplish gloss, the belly being white, the naked lores and orbits black, the cere and base of the bill yellow, the tip bluish, and the feet horn-coloured. Throughout the whole genus, which is Central and South American, the female has a curly crest barred with white. The remaining nine species differ in being greenish-black, and—except *C. fasciolata*—have a frontal knob, with or without a basal wattle

Fig. 45.—Crested Curassow. *Crax alector.* $\times \frac{1}{7}$.

on each side of the mandible, the colour of these parts varying from scarlet or yellow to pale blue or purplish-black. The tail may be tipped with white; the females often exhibit white barring above, and have the plumage relieved by buff and chestnut. *Nothocrax urumutum*, ranging from British Guiana to the Upper Amazons, is chiefly chestnut above vermiculated with black, and cinnamon below; the wings and tail being blackish with buff markings, the throat chestnut, the long crest black, the naked lores and orbits yellow and purplish, the bill scarlet, the feet flesh-coloured. The female has the lower parts mottled with dusky. *Mitua mitu* of British Guiana, Brazil, Peru, and Bolivia is blue-black, with chestnut

belly, white-tipped tail, red bill and feet; the crest being well-developed. *M. tomentosa*, of the first two countries only, has a shorter crest and chestnut-tipped tail, whereas *M. salvini* of Ecuador has a white belly. *Pauxis galeata*, the Cashew-bird, inhabiting Venezuela, Colombia, and Peru, is glossy greenish-black with white abdomen and tip to the tail; the frontal knob, supposed to resemble a Cashew nut, being dull blue. The female shows a large admixture of chestnut and buff.

Sub-fam. 2. *Penelopinae*.—The fifteen species of *Penelope* are brown or olive-green, more or less varied with chestnut and rufous, or washed with purple or bronze; the feathers, moreover, have often whitish margins, the head in *P. pileata* and the outer primaries in *P. albipennis* becoming almost white. The wattled throat is generally feathered in *P.* (*Stegnolaema*) *montagnii*, but naked elsewhere, the colour being given as carmine in *P. cristata*, where the feet are red. The orbits are also bare, the crest is moderate, and the metatarsus in some cases is partly feathered. Two members of the genus inhabit Central America. *P. obscura*, the Pavo del Monte, alone reaches Northern Argentina, where *Crax fasciolata*, *Pipile cumanensis*, and *Ortalis canicollis*, the Charata, also represent the Family. *Penelopina nigra*, of the Guatemalan highlands, is greenish-black, barred and mottled with brown and buff in the female; the naked orbits are purplish, the bare throat, large wattle, bill and feet red. *Ortalis* contains about seventeen forms, some hardly worthy of specific rank, of which five occur from South to Central America and one—*O. vetula*, the Chiacalaca—extends to Texas. *O. ruficauda* is found in Tobago and the Grenadines. The coloration is brown or olive, with little or no metallic gloss, but relieved by chestnut, rufous and grey; the breast and belly being occasionally white or buff, the naked orbits and sides of the throat apparently reddish, and the feet pinkish, grey, or blue. *Pipile cumanensis*, of South America northwards from Bolivia and Brazil, with Trinidad, is greenish-black; a white crest of pointed feathers reaches the sides of the neck, some white shews on the wings and chest; the cere, naked orbits, lores, throat and wattle are blue, the feet red. *P. jacutinga* of South-East Brazil and Paraguay has a purplish gloss above, and a red wattle; *P. cujubi* of the Lower Amazons a brown crest margined with white. *Aburria carunculata* of Colombia and Ecuador is greenish-black, with a scantily-feathered throat and long thin wattle. *Chamaepetes*

goudoti, of the same countries and Peru, is bronzy-brown with greyish head and rufous under parts; the Costa Rican and Veraguan *C. unicolor* being nearly uniform greenish-black. In both these genera the orbits are more or less naked.

Sub-fam. 3. *Oreophasinae.*—*Oreophasis derbianus*, the splendid "Faisan" of the Volcan de Fuego in Guatemala, is greenish-black with dense velvety plumage extending from the forehead to the nostrils; the white lower parts become brownish at the sides and vent, and shew dark streaks; a white band crosses the tail; and a red cellular casque covered with hair-like feathers surmounts the head. The bill is pale yellow, the feet are vermilion.

Fam. VI. **Phasianidae**.—Of really distinct Sub-families this group may be said to possess three, (1) the *Numidinae*, or Guinea-fowls, (2) the *Meleagrinae*, or Turkeys, and (3) the *Phasianinae*, or Pheasants, Partridges, and Grouse; it is, however, customary to class the Grouse apart as *Tetraoninae*, though a difficulty at once arises in drawing the line of demarcation. For example, Huxley [1] considered *Caccabis*, *Francolinus* and *Coturnix* Galline, *i.e.* Phasianine; Dr. Gadow [2] makes them Tetraonine; while Mr. Ogilvie Grant [3] agrees with the former, but does not make these genera the link between the sections. Mr. Grant's view may be conveniently followed, but the division is in any case arbitrary. As a matter of further convenience a Partridge group (*Perdicinae*) may be formed, and the "American Partridges" may stand apart as *Odontophorinae*.

Passing mention should be made of the economical importance of this Family as a factor in our food-supply, whether in the wild state as game, or in the domesticated as poultry; for almost inconceivable numbers of birds are bred, exported, or used for eating in their native countries, while the value of domestic fowls' eggs can best be estimated by imagining the consequence of a failure in the production. Man's custom herein is no doubt guided by the ease with which most of the species are secured or reared, and by the great development of the pectoral muscles or "flesh of the breast."

The body is decidedly heavy, the head usually rather small, and the neck fairly long. The bill is comparatively short and stout —especially in *Ithagenes*, *Dendrortyx*, and elsewhere—but may be more elongated, as in *Lophophorus* and *Euplocamus;* the maxilla

[1] *P.Z.S.* 1868, p. 301. [2] Bronn's *Thier-Reich*, *Aves*, *Syst. Theil.* 1893, p. 172.
[3] *Cat. Birds Brit. Mus.* xxii. 1893.

being curved, and overhanging the mandible, which exhibits two serrations on each side in the Odontophorinae. The metatarsus is strong and relatively short in Grouse and many Partridges, but in Pheasants and similar forms it is much longer; the feathering descends to the toes in the Tetraoninae, except *Bonasa* and *Tetrastes*, the digits themselves being clothed in *Lagopus*, naked and pectinate at the sides in the remaining genera. No other members of the Family shew pectinations or have the metatarsus feathered, save *Lerwa*, where it is half covered. The hallux, invariably elevated, has only a rudimentary claw in *Rollulus*, *Melanoperdix*, and *Caloperdix*; *Arboricola*, *Dactylortyx*, and *Cyrtonyx*, on the contrary, have particularly long and somewhat straight claws. Spurs are of frequent occurrence on the feet of the males, though rare in the females, some species possessing as many as three pairs; they are never found in the Tetraoninae or Odontophorinae, and are represented by mere knobs in *Acryllium* (Numidinae). The wings are short and rounded, with ten primaries and from twelve to nineteen secondaries, both decreasing in length as they near the middle of the wing, which has thus a bilobed appearance when expanded. The primaries usually increase in length before decreasing, but in some cases the exterior quill is the longest, while in *Faleipennis* two or three of the outer feathers are sickle-shaped, and in *Argus* the secondaries are enormously developed. The tail is extremely variable, being long and rounded in *Lophophorus;* long and sharp-pointed in *Phasianus* and *Centrocercus;* moderate, broad, and rounded in *Lagopus*, *Odontophorus*, and so forth; similar but more truncated in *Meleagris;* short in most Partridges; and exceptionally abbreviated in many Quails. The coverts far exceed the tail in the Peacock, forming its splendid train, while they are much elongated in *Chrysolophus*, and to some extent in *Coturnix*, *Excalphatoria*, and *Ceriornis* (*Tragopan*). In *Pediocetes* the two middle rectrices surpass the rest and terminate abruptly; in *Lyrurus* the exterior feathers fork outwards; in *Crossoptilon* and *Gennaeus* the median plumes curve over the others; and in *Lobiophasis* not only is this the case, but the rhachis extends beyond the webs, which are much reduced on the outer side of the lateral quills; in *Argusianus* and *Rheinardtius* the middle pair is extraordinarily lengthened. The whole tail is compressed or "vaulted" to a greater or less degree in *Gallus*, *Chrysolophus*, *Lophura*, *Acomus*, *Gennaeus*

and *Crossoptilon*. *Excalphatoria* is remarkable for possessing only eight rectrices; ten are found in *Mieroperdix*, and occasionally in *Synoeeus* and *Coturnix;* but the usual number is from twelve to twenty-four, while *Lobiophasis* has thirty-two in the male and twenty-eight in the female. The nostrils are concealed by the feathering in the Tetraoninae alone, the aftershaft is large except in *Pavo*, the furcula is Y-shaped, the tongue sagittate, the syrinx tracheo-bronchial. The globular crop and muscular gizzard are decidedly characteristic, yet *Argusianus* has been said to lack the former, and *Centroeereus* the latter. In the male of *Tetrao urogallus* and both sexes of *Guttera* the trachea has a loop, which in the latter case passes through a cavity in the head of the furcula.

The plumage is of the most varied description, the winter coat of *Lagopus* being commonly white, the males of *Lyrurus*, *Tetrao*, and *Melanoperdix* nearly black, while the prevailing colours in *Chrysolophus pietus* are orange and red, in *Gennaeus nycthemerus* black and white, in *Rollulus* dull green and maroon, in *Gallus* orange, red, purple, green, black, and white, in *Phasianus* metallic green, orange, and brown. In the *Numidinae* white or bluish spots mark the blackish ground-colour; in the American Grouse black, brown, yellowish-buff and white occur in varying proportions; while the Partridges and Quails exhibit, as a rule, still more sober tints of brown, relieved by dull red or buff. Peacocks, again, show a combination of beautiful metallic blues and greens with copper and buff, rarely found elsewhere in the Family; nor must *Lophophorus*, *Lophura*, *Lobiophasis*, and *Ceriornis* be left out of consideration. The ocelli or "eyes" on the Peacock's train hardly require mention; *Polyplectron* has similar adornments on both the tail and the upper parts in the male, on the tail alone in the female; *Argusianus* on the secondaries and rectrices in the male, *Meleagris oeellata* on the latter in both sexes. The feathers of the crown are curled in *Crossoptilon*, *Pavo*, and *Lophophorus sclateri*, and fine crests are by no means uncommon; the component plumes being more or less racquet-shaped in *Lophura* and *Lophortyx*, and in *Pavo eristatus* consisting of webs at the end of bare shafts. The crests of *Chrysolophus* and *Gennaeus* are recumbent, those of *Rollulus* and *Rheinardtius* upright; while, among others, the full head-tufts of *Ithagenes* and most species of *Lophophorus*, with the comparatively short ornaments of *Haematortyx*, *Ceriornis*, and *Callipepla* are worth notice. *Crossoptilon*,

Pucrasia, and *Phasianus* have elongated ear-coverts or feathers behind the ear, the white plumes of the first-named being especially remarkable and common to both sexes; an erectile cape surmounts the nape in *Chrysolophus; Meleagris* has a peculiar patch of long bristles on the breast, *Bonasa* a ruff on the sides of the neck; *Gallus* and *Acryllium* have hackles or lanceolate feathers in various parts, moulted—in the former at least—during the summer. All these decorations are absent or less pronounced in the females, which are, as a rule, dull in colour.

The head is entirely naked in *Meleagris*, and is covered with caruncles, an erectile process hanging from the forehead; a pair of long fleshy horns above the eyes distinguish *Ceriornis*, which has in addition a large wattle on the throat; a comb of similar substance is accompanied by a single median or two pairs of lateral wattles in *Gallus*; while the sides of the face, the orbits, or the fore-neck, are bare in many genera. The male of *Lobiophasis* has the head nearly naked, with no less than three pairs of wattles; though the female has but one rudimentary pair of the latter, and only the cheeks unfeathered. In all these cases the skin and outgrowths are red or blue. The head and neck are bare in the Numidinae, except for a crest in *Guttera*, a crescentic nuchal band of feathers in *Acryllium*, and a line of plumage down the crown in *Phasidus;* wattles occur at the angles of the gape in *Guttera* and *Numida*, both these and the naked skin being blue and red throughout the Sub-family, save in *Phasidus*, where the latter is yellow, and in *Agelastes*, where it is red and white. The bony casque of *Numida* is red or horn-coloured. The Tetraoninae have merely a little red or yellow skin over the eye. In females all the fleshy outgrowths are much smaller or absent, throughout the Family.

Air-sacs of orange skin lie below the side-feathers of the neck in the males of *Centrocercus*, *Dendragapus*, and *Tympanuchus*, and become visible when inflated; they are supposed to produce the booming ventriloquistic sound, uttered in the breeding season. *Bonasa* has a naked space in a similar position, but its drumming is stated to be caused by the wings. *Pediocetes* can hardly be said to have air-sacs, yet it also drums, while the exact nature of the corresponding sounds made by *Tetrao urogallus* and *Lyrurus tetrix* is uncertain. The "gobble" of the domestic Turkey is a parallel instance, in so far as it is uttered during excitement.

The members of this Family, which range in size from the

splendid Capercaillie (*T. urogallus*) to the small Quail-like *Excalphatoria sinensis*, are all weighty birds for their bulk, rising heavily and noisily, and travelling with low and steady, though often laboured, flight; in many cases the pace is extremely rapid, but comparatively short distances are covered before alighting. On the whole, they are certainly partial to dry localities, which may, however, be prairies and heaths, as in many Grouse, wooded or open country generally, as in Pheasants, or stony hill-sides, as in *Tetraogallus*, *Ammoperdix*, and some species of *Lagopus* and *Caccabis*; yet a few seem to prefer the vicinity of marshes, and others are constantly met with at considerable elevations. The great facility with which game-birds run, their frequent custom of lying until they are almost trodden upon, and that of combining into coveys or packs consisting of two or more broods, are too well-known to need lengthy description here. The strutting and parading of the cocks of the larger species is fully noticed below, while the habit common to most forms of dusting themselves, instead of washing, is also noticeable. Many are almost entirely terrestrial, a love for trees being in fact exceptional; nevertheless, instances might easily be adduced of roosting on branches or taking refuge there when disturbed, and though *Lagopus*, *Francolinus*, and *Perdix* are notoriously averse to perching, the writer himself has seen five or six Red Grouse sitting on low trees, within half an hour. *Tetrao*, *Lyrurus*, *Phasianus*, *Pavo*, and *Melcagris* well exemplify the polygamous habits not unfrequent in the Family, the males in such cases usually deserting their mates during incubation; *Coturnix* and *Ortyx*, moreover, are stated to be not invariably monogamous. The nest is nearly always on or close to the ground, and is formed of a few twigs, grass, moss, feathers, and leaves; the hole, usually scraped as a commencement, being sometimes barely lined. *Polyplectron*, as a rule, deposits two eggs, but the number in most species is much greater, from sixteen to twenty being not uncommonly found, or even more where two hens lay together—a fairly ordinary practice in the group. The colour in Grouse is yellowish or reddish, either with rufous spots or close blotches of black, purple, or orange-brown; in the Pheasant and Partridge it is uniform olive, and in the Odontophorinae pure white, with or without brown or red markings. Further information is given

below. Few Galline birds, besides the American Partridges, breed twice in a season. The male has been observed to incubate in *Ortyx*, and in this genus and *Odontophorus* domed nests are on record, while many species lay their eggs in depressions under over-arching tufts of heather or grass. Incubation lasts from eighteen to twenty-eight days, the young running almost from the shell. The note is shrill in Guinea-fowls, Partridges, and Quails, somewhat whistling in *Polyplectron* and *Tetrastes*, and generally consists of two or more syllables; but in view of subsequent details, it is sufficient to particularize the "cok-cok-cok" of the Grouse, the crow of the Pheasant and the Cock, the cluck and cackle of the Hen, the scream of the Peacock, and the gobble of the Turkey. The food is chiefly vegetable, and includes shoots, buds, leaves, grass, bulbs, seeds, berries and other fruits, with a certain amount of grit; but worms, molluscs, ants and their cocoons, insects and their larvae, swell the list. Juniper twigs or berries are supposed to give a flavour to the Hazel Grouse, pine tips to the Capercaillie, whereas the "Sage-brush" of America (*Artemisia tridentata*) bestows its name upon the Sage-cock (*Centrocercus*), and makes its flesh bitter and unpleasant. The Pheasant scratches in the ground for provender, as do Turkeys and Fowls, while *Lophophorus, Catreus, Crossoptilon, Gennaeus, Pavo*, and so forth, dig for roots with the bill. American Grouse, after eating *Kalmia* shoots, are actually poisonous.

Pugnacious habits are prevalent in the Family, and naturally attain their height in the courting season; but chief of all in this connection is the genus *Gallus*, which will fight at any time of year, being highly valued by the boatmen of Burma for the sport it provides. These wanderers commonly keep a cock tied by the leg in their vessels, or possess a decoy-bird to attract its wild relatives. Game-birds are easily naturalized or domesticated owing to their terrestrial habits; they hybridize readily even in a state of nature, the offspring being often fertile; such species, moreover, as the Pheasant, Partridge, and Red-legged Partridge will frequently use a nest in common. Occasionally the female assumes a plumage like that of the male; for example, in the Pheasant, where such individuals are called "Mules," and are stated to be barren. Further questions of great interest are the moult, the Grouse disease, the shedding of the claws in the Ptarmigan, and of the horny fringes of the toes in the Tetrao-

ninae generally, besides such points as the loss of the Peacock's train in summer, and the innumerable phases of plumage of the Red Grouse, Ptarmigan, and "Bob-white" (*Ortyx*), none of which can be usefully discussed in a limited space.

The range of the Family is nearly cosmopolitan; but the Meleagrinae only occur in the United States and Central America; the Numidinae in Africa, with Madagascar and the neighbouring islands; and the Phasianinae in the Palaearctic and Indian Regions as far eastward as the Philippines, China and Japan, and—in the case of *Gallus*—Celebes. The Perdicinae are found in the Palaearctic, Indian and Australian Regions, though becoming decidedly scarce in Oceania; the Odontophorinae occupy temperate and tropical America to Bolivia and Brazil southwards; while the Tetraoninae are holarctic, the New World genera being more numerous than those of the Old World, and *Lagopus* alone being common to both hemispheres.

Sub-fam. 1. *Numidinae.*—Of the curious-looking Guinea-fowls, or Pintados, *Acryllium vulturinum* of East Africa has a long, wedge-shaped tail, and elongated hackles on the mantle, chest, and lower neck; the upper neck and head being naked and blue, with a crescentic nuchal band of short chestnut feathers, and each metatarsus possessing four or five knobs in the male. The hackles are black and white, mostly fringed with blue; the remaining upper parts and the flanks are black spotted with white, having a purple wash on the latter; the breast and belly are cobalt, marked with black centrally. *Guttera* contains four black species with light blue spots, which show much white on the secondaries. A full and usually curly black crest adorns the crown; the bare head and neck, with its posterior flap of skin, is blue or purplish, and the throat is red, except in *G. pucherani* of East Equatorial Africa, where the hind-neck only is blue, and *G. eduardi* (*verreauxi*) of South Africa, with no bright colours on the head, neck, or throat. The latter, and *G. cristata* of northern West Africa, have rudimentary blue wattles at the gape, coupled with a black collar, which in *G. eduardi* extends to the breast and assumes a chestnut shade. *G. plumifera,* ranging from Cape Lopez to Loango, has larger wattles and a thin erect crest; *G. pucherani* has the outgrowths red. This genus and the next have no spurs. *Numida,* remarkable for the bony casque surmounting the naked head and neck, possesses seven or more members of clumsy build, with

white spots on the black plumage. *N. meleagris* of West Africa and several of its islands, introduced in Ascension and the Greater Antilles, which is the origin of our present domestic stock, has the broad gape-wattles and bare tracts red, save for a blue hind-neck; the small conical helmet is yellowish, and a wide grey ring divides the neck from the body. *N. coronata* of eastern South Africa, *N. reichenowi* of East Africa, *N. cornuta* of western South Africa, *N. marungensis*, found from Benguela to Tanganyika, *N. mitrata* of East Africa, Madagascar, and the islands in the vicinity, and *N. ptilorhyncha* of North-East Africa, lack the collar and differ from each other in the shape of the large helmet, which may be upright or inclined backwards. *N. ptilorhyncha* has the naked parts blue, and a bunch of horn-coloured bristles at the base of the maxilla; *N. coronata*, *N. mitrata*, and *N. reichenowi* have a reddish casque, a scarlet top to the head, and blue cheeks and neck; the wattles being red in the last, but blue tipped with red in the first two, as in *N. cornuta*, where the helmet is vermilion. *N. marungensis* has a stouter, shorter helmet than *N. coronata*, which it much resembles. *Agelastes meleagrides* of West Africa is black vermiculated with whitish, and has a zone of white feathers at the base of the neck; the bare skin of the head is red, of the neck white. The male has a strong spur on each metatarsus, as has *Phasidus niger*, ranging from Cape Lopez to Loango, which is brownish-black with a band of feathers from the base of the bill to the occiput; the naked head is in this case yellow, becoming orange on the neck.

As regards habits, *Numida meleagris* may represent the group. This wild suspicious bird is found in flocks of a dozen or even a hundred, not invariably of its own species, which frequent thick bushes, tall grass, or rocky river-sides; it runs swiftly and with perfect ease, occasionally travelling twenty miles a day; while, though the short wings and heavy body preclude extended flights, it travels with considerable power. When disturbed it usually seeks the trees, in which it roosts at night, and under which it shelters from the sun. The food consists of grass, seeds, roots, bulbs, berries, and insects, the ground being often torn up in the search; the noisy cry is hoarse and discordant, or sharp and metallic; the nest is a depression with little or no lining, placed in or under a tussock, and contains from twelve to twenty yellowish eggs with undecided

rusty spotting. *Phasidus* is not gregarious. The rock-loving *Numida ptilorhyncha* attains an altitude of nine thousand feet.

Sub-fam. 2. *Meleagrinae.*—Of the Turkeys,[1] there are only two species, *Meleagris gallipavo* and *M. ocellata.* The former has three races—distinguished by the tail and its upper coverts being tipped with white, buff, and chestnut respectively—the united range extending from Southern Canada to Mexico through the Eastern and South-Western States. They are coppery-bronze, with purplish-green and golden sheen and black markings; the remiges being brown barred with white, and the tail black and brown with broad dark sub-terminal band. The reddish head and neck are nearly bare, shewing wrinkled warty skin and a pendent erectile process on the forehead; a bunch of long black bristles decorates the chest of the male, which has a stout spur on each metatarsus. The bill and feet are red. *M. ocellata* of Yucatan, British Honduras, and Guatemala, has black plumage, tipped with brassy-green, and fringed with greenish-copper, that becomes redder below; the rump region is steel-blue, and brilliant ocelli of green-blue margined with copper mark the ends of the greyish rectrices and their coverts. The frontal caruncle and the head are blue, with red tip and excrescences respectively, while the pectoral tuft is absent.

The wild Turkey is wary and extremely quick of foot, spending the day chiefly upon the ground and roosting high in the trees; it frequents wooded country, and feeds upon plants, seeds, nuts and other fruits, with lizards and insects. In spring the males fight viciously, and show off before the assembled hens; strutting around with erect, outspread tails and drooping wings, while uttering puffing and gobbling noises. Each cock having secured a mate or two, breeding takes place, after which the sexes separate, but combine again in autumn and wander widely in search of food. A hole, scraped under some log or tuft of herbage, and lined with dry leaves, receives the yellowish-white eggs with red-brown spots; the number varying from ten to eighteen, or even more if several hens co-operate.

Sub-fam. 3. *Phasianinae.*—Among these a detailed description is unnecessary of the fine blue, green, and rufous plumage of the Peacock (*Pavo cristatus*), or of the green, purple, copper, and gold ocelli

[1] This name, and the Latin *Melcagris*, seem to have originally belonged to the Guinea-Fowl. *M. gallipavo*, the origin of our farm-yard Turkey, was domesticated in Europe by about 1530. Cf. A. Newton, *Dict. Birds*, 1896, pp. 994-996.

on its elongated train of erectile tail-coverts; but other striking points are the bare-shafted crest and naked white face; while the comparatively dull-coloured Pea-hen lacks the train of the male and the spur on each metatarsus. In the wild state these birds are shy, and run particularly fast, while they occasionally fly in small flocks: they inhabit the hill-forests or ravines near water-courses in India and Ceylon, roosting in large trees, making a slight nest on the ground, ruined buildings, or more rarely branches, and laying from four to about ten yellowish or reddish eggs, sometimes faintly spotted with rufous. The cry is a harsh mewing squeal, or a "cok-cok-cok" when flushed; the food resembles that of the Turkey, but is at times varied by fish or flesh; and, as in that bird, the males are said to dance or strut around when courting, each securing three or four consorts. Peafowl are supposed to indicate the proximity of tigers, and are sacred to various Indian castes, while foolish superstition considers the "eyed" feathers unlucky! Introduced to England at some very early date, they were formerly thought a great delicacy for the table. *P. nigripennis*, the "Japanned Peacock," is a species, or perhaps variety, with deep blue wing-coverts and other slighter differences, the female being almost entirely greyish-white; *P. muticus*, a valid species from the Indo-Chinese countries and Java, is distinguished by the golden-green neck and chest and the blue and yellow skin of the face; the crest feathers being here fully webbed.

Argusianus argus, the Argus Pheasant, has a short black crest; black, rufous, and buff plumage with white barring on the nape and tail-coverts; and enormously developed secondaries and median rectrices, covered respectively with large reddish-yellow and small white ocelli, which are margined with black; the naked cheeks and throat are blue, the bill is bluish-white, the feet are red. It inhabits the forests of the Indo-Malay mainland and Sumatra, the cock being said only to meet the hens occasionally, and to reserve an open spot for courting purposes, where he shows himself off by dancing before them with the tail and secondaries expanded into a large fan. This bird flies little, but runs with celerity, having a loud cry, feeding on vegetable matter and insects, nesting like the Pea-fowl, and laying similar eggs. *A. grayi* of Borneo shows white on the mantle and much red on the breast, *A. bipunctatus* is only known from an imperfect primary. The females lack the ocelli and elongated tail. *A.*

(*Rheinardtius*) *ocellatus*, of the Tonkin highlands, is brown with reddish markings and minute white dots; it has a hairy occipital crest, and exhibits fine red spots, with black white-eyed central rings, on the very long median rectrices and their upper coverts.

In *Polyplectron* (Peacock-Pheasant) the male has two or even three spurs on the metatarsus. *P. chinquis* of the Indo-Chinese countries is brown, with whitish dots above and mottlings below; the head is black and white with naked yellowish sides; the upper plumage is adorned with large, round, metallic, purple-green ocelli, ringed successively with black, brown, and buff, of which the tail and its upper-coverts exhibit one on each web. *P. germaini* of Cochin China has close-set light brown specks above, and a red face; *P. bicalcaratum* of the Malay Peninsula and Sumatra has the latter similarly coloured, with black and buff upper surface, a narrow purplish crest, and lateral rectrices with an "eye" only on the outer web; *P. schleiermacheri* of Borneo has the crest curled forward, and blackish under parts with a white median band; whereas *P. nehrkornae* of Palawan, and the doubtfully distinct *P. napoleonis*, are entirely black below. As regards the duller females, *P. chinquis* and *P. germaini* have obscure ocelli on both webs of the lateral tail-feathers, the other species on the outer web only; moreover, *P. chinquis*, *P. schleiermacheri*, and *P. nehrkornae* have none on the tail-coverts, the latter lacking the black blotches on the mantle found in *P. bicalcaratum* and *P. schleiermacheri*. *P.* (*Chalcurus*) *inopellatus* of Sumatra is brown and buff, with purple and black tints on the tail. Little is known of the habits, except in *P. chinquis*, which is apparently monogamous, and frequents thick hill-forests up to an altitude of five thousand feet. It feeds like the Peafowl, has a fine whistling call varied by a soft cluck, and will take refuge in trees, though preferring to escape on foot. The cock carries his outspread tail on one side, while the hen uses hers to shelter the young. The fairly substantial nest of twigs and leaves, usually containing two brownish eggs, is placed on the ground.

Of the four species of *Gallus*, *G. ferrugineus* (*bankiva*), the Red Jungle-fowl—Bhund Moorg of the natives of India—shewing much resemblance to the "Black-breasted Game" breed, is the origin of our domestic stock.[1] It has a vaulted tail with long drooping median feathers, a serrated red comb, naked red face and throat,

[1] For a full account see Tegetmeier, *Ibis*, 1891, pp. 304-327.

with a wattle on each side of the latter, a spur on each metatarsus, and ear-lappets, which are whitish in Indian examples, but red in Burmese and Malay. The crown and the hackles of the mantle and rump are orange-red, the back is chiefly purplish-red, and the wings, tail, and under parts are glossy greenish-black, with yellowish outer margins to the primaries and brownish to the secondaries. Between June and September the hackles and long tail plumes are replaced by short black feathers. The hen has little comb, no wattles, spurs, or elongated rectrices; the crown is reddish and the mantle yellowish, both with black stripes; the wing- and tail-quills are brown and rufous; the remaining plumage being reddish-brown, deeper on the fore-neck and brighter on the chest, with black mottling above. This Jungle-fowl ranges from North-Eastern and Central India to Hainan, and from Sumatra to the Philippines, Celebes, and Timor; frequenting thickets and forests up to five thousand feet, but often flocking to cultivated country, where it feeds upon leaves, seeds, insects, and especially grain. Pugnacious towards its kin [1] it is timid with man, running with great speed or taking refuge in trees; the flight consists of alternate periods of flapping and sailing, while the cluck of the hen and the crow of the cock resemble those of domestic fowls, though the latter is less prolonged. The nest is a hole lined with leaves, grass, or plant-stems, containing from seven to twelve buff eggs; polygamy being apparently rare. *G. sonnerati*, the Grey Jungle-fowl of Southern, Central, and Western India, is distinguishable by the dilated shafts of the neck-hackles, with their wax-like yellow tips or spangles; *G. lafayettii* (*stanleyi*) of Ceylon by the yellow comb with red margin, and the red breast. The former utters a broken crow, the latter a double note, the eggs in both cases being spotted, and occasionally whitish in ground-colour. *G. varius* of Java, Lombok, and Flores, is greener, with truncated neck-feathers, an unserrated comb, and a single median wattle of red, yellow, and blue-green. The hens of *G. sonnerati* and *G. lafayettii* have white breast-plumage, barred and fringed with black, the former shewing black mottlings instead of bars on the secondaries; that of *G. varius* has a buff breast and a blackish back. In these three species crosses with domestic fowls are said to be usually sterile.

Chrysolophus pictus, the brilliant Golden Pheasant, has the

[1] Cock-fighting in England is beyond the scope of this work.

crown and full recumbent hair-like crest golden, the fine erectile cape of truncated nape-plumes orange with blue-black bars, the mantle dark green and purple, the rump golden, the primaries brownish, the secondaries purplish with chestnut and black coverts, the larger tail-coverts and the vaulted tail with its two very long median rectrices black, with brown spots or stripes, the scapulars and under parts scarlet, and the cheeks and throat rufous. There are generally two spurs on each metatarsus, and the bare orbits are yellowish. The female is brown, relieved by black and buff, and has a shorter tail, no crest or cape. This bird, difficult to naturalize in Britain, but easily domesticated, inhabits wooded mountains in South and West China and East Tibet, meeting in the last two countries the equally beautiful Lady Amherst's Pheasant (*C. amherstiae*), which has dark green crown, mantle, throat, and chest, blood-red crest, white cape with blue-black bars, black and buff rump, glossy green and brown wings, white breast and abdomen, and black and white tail with scarlet and orange tips to the coverts. The orbits are blue in both sexes, the female being otherwise as in *C. pictus*.

The original Pheasant of Britain—probably introduced by the Romans—was *Phasianus colchicus*, ranging from the Caspian to South-East Europe; but the Ring-necked species (*P. torquatus*) of Manchuria, East Mongolia, Corea, Tsu-sima, and Eastern China, imported towards the end of last century, has interbred with it so freely that typical examples are now exceptional. The latter form has a white collar and slaty lower back with dark green barring; while the former has the rump feathers buff, with black mottlings and purplish-red tips. The females, hardly separable from one another, lack the red face-wattles, the long ear-tufts, and the pair of spurs of the male. The above-mentioned colour of the lower back and the comparatively broad black basal tail-bands, are the distinguishing points of a section, which comprises *P. torquatus*, *P. elegans* of West China, *P. vlangali* of Tsaidam, *P. strauchi* of Kansu, *P. decollatus* of Western and Central China, *P. satschuenensis* of Sa-tscheu, *P. formosanus* of Formosa, and *P. versicolor* of Japan. Another section, more akin to *P. colchicus*, contains *P. tarimensis* and *P. zerafshanicus* of the Tarim and Zerafshan Valleys, *P. persicus* of Persia and Transcaspia, *P. principalis* of North-East Persia and North-West Afghanistan, *P. shawi* of East Turkestan, *P. chrysomelas* of the Amu-Darya, and

P. mongolicus, extending from the Syr-Daria to Mongolia. All these races have the crown greenish, and differ chiefly in the colour of the scapulars, breast, rump, and abdomen; a white collar occurring in *P. torquatus*, *P. mongolicus*, *P. satscheunensis*, and *P. formosanus*, while *P. versicolor* is green below. Where two forms meet hybrids are not uncommon. In *P. soemmerringi* of Japan, *P. ellioti* of South-East China, and *P. humiae* of Manipur

FIG. 46.—Pheasant. *Phasianus colchicus*. $\times \frac{1}{7}$.

and Upper Burma the crown is red-brown, the first species having the lower back maroon with gold reflexions, the two others a black and white rump, with white and chestnut belly respectively. *P. reevesi* of North and West China has the crown white encircled by black, the nape and throat white with a subjacent black collar, the remaining upper parts yellowish-red and black, with white and rufous on the wings, the breast black, white, and chestnut, the abdomen black, the tail is extremely long.

Space is wanting to describe the various females, or to discuss the sport that Pheasants afford; but the swift flight, the powers of foot, the polygamous and pugnacious habits, the olive-coloured eggs, and the immense numbers reared artificially, must be noticed.[1] *P. reevesi*, Reeves's Pheasant, *P. versicolor*, the Green Pheasant, and *P. soemmerringi*, the Copper Pheasant, have also been introduced into Britain, the two latter and *P. torquatus* into Oregon, *P. colchicus* into the Eastern United States; New Zealand has received both *P. colchicus* and *P. torquatus*, St. Helena and Ascension *P. torquatus* only—the former island as early as 1513.

Catreus wallichi of the Himalayas has a brown head with fine white-tipped crest; a grey neck, yellowish and whitish upper parts, black and buff primaries, and a rufous rump, all with black barring; the under surface is light buff with black marks, the naked orbits are red. The male has a pair of spurs and very long median rectrices; the female being brown mottled with black and buff, having a smaller crest, a shorter tail, and at times rudimentary spurs. Considerable flocks frequent the grassy forest-hills up to an altitude of eight thousand feet, lying very closely in the day-time, though running with great speed when disturbed, and flying heavily for a short way; they feed towards evening on roots, seeds, berries, grubs, and insects, reiterating the peculiar call, whence they are named "Cheer." The slight nest, generally sheltered by a bush or tussock at the base of a hill, contains from nine to fourteen whitish or pale drab eggs, sometimes sparingly spotted with red-brown.

Pucrasia contains six species or local races of "Pukras" or "Koklas" Pheasants, with long, black, erectile ear-tufts in the male, which has a spur on each metatarsus, but no naked cheeks. *P. macrolopha* of the Western Himalayas has a well-developed buff crest, a greenish-black head and neck with a white patch on each side of the latter, grey upper parts and whitish flanks with black shaft-stripes, brownish wings marked with buff, chestnut under parts and median feathers of the elongated, wedge-shaped tail, and blackish lateral rectrices with white tips. The black and rufous hen has a white throat, a short crest, and no ear-tufts or spurs. *P. castanea* of North Afghanistan and Kafiristan has the mantle chestnut, *P. nipalensis* of the Central Himalayas black varied by grey and reddish; *P. meyeri* of South Tibet and the

[1] Much interesting information is given in Yarrell's *Brit. Birds*, ed. 4, iii. 1882-84, pp. 91-104, and Tegetmeier, *Pheasants: their Nat. Hist.* etc., ed. 2, 1881.

Upper Mekong possesses a yellow nuchal collar; *P. darwini* of East China has grey bases to the outer tail-feathers; *P. xanthospila* exhibiting both. These monogamous birds attain a somewhat higher elevation than the Cheer, and utter a loud, deep crow: but otherwise the habits are the same. The five to nine pointed eggs are buff, speckled or blotched with red-brown.

Gennaeus[1] has a long vaulted tail, a fine crest, naked sides to the face covered with red skin or wattles, and metatarsi with a single spur in the male. In *G. albicristatus* of the Western Himalayas the crest is white, the head and upper parts being black with purple and blue reflexions and white margins to the dorsal feathers, the primaries and abdomen brown, and the breast whitish. The female is reddish-brown, with delicate black markings on the grey-margined upper feathers, and shews white below and on the wing-coverts. *G. leucomelanus*, with blue-black crest, inhabits Nepal; *G. nuthura* (*melanotus*), without white on the lower back, occurs in Sikkim and Bhutan; *G. horsfieldi*, with black breast, extending from East Bhutan to North Arakan and Upper Burma. All the above species have the tail black, or rarely vermiculated with white; but in *G. lineatus* of Burma, Siam, and Tenasserim, and the very similar *G. andersoni* of Upper Burma and West Yunnan, it is banded alternately with black and white, and the median rectrices are even whiter. *G. edwardsi* inhabits Annam. *G. nycthemerus*, the Silver Pheasant of South China, embroidered as a badge on mandarins' dresses, and introduced into England early in last century, has an extremely long white tail, obliquely marked with black on the lateral feathers, a purplish-black crown, crest and lower surface, white back of the neck and upper parts with crescentic black lines on the latter, and naked red face. *G. swinhoii* of Formosa is easily distinguished from its allies by the bronzy-crimson scapulars, white crest, upper back, and median rectrices; the remaining plumage being bluish- or purplish-black with a glossy dark green band upon the wing. The female is mottled with rufous, black, and buff, and has a short crest, while that sex of the Silver Pheasant is browner, and exhibits white on the outer tail-feathers. These "Kalleges"—a name strictly applicable to the first four species only—frequent thin forests in low valleys, and are but slightly gregarious; they perch on trees, and

[1] *Euplocamus* and *Gallophasis* are synonyms of the above.

fly short distances when flushed; the note is a shrill crow, a "whistling chuckle" or a "chirrup;" the food is as usual in Pheasants. The pugnacious male is said to strut with outspread tail, and to drum with his wings while courting; the nest, formed of dry herbage in a depression of the soil, contains from nine to fourteen creamy or reddish-buff eggs.

The "Eared" or Snow-Pheasants (*Crossoptilon*) have a vaulted tail with decomposed webs to the long decurved median feathers, fine white ear-tufts, and lax hairy plumage, shorter and curled on the crown. The naked papillose cheeks and the metatarsi are red, with a pair of stout spurs on the latter in the male. *C. tibetanum* of West China and East Tibet is white, with black crown, dark brown remiges, and greenish- or purplish-black rectrices. *C. leucurum* of East Tibet has the tail white with blue-black tip, as has *C. manchuricum* of Manchuria and North China, in which the mantle, nape, and breast are blackish-brown, with a faint white band between the ear-coverts, found also in *C. auritum* of West China and Koko-Nor, and well defined in *C. harmani* of Tibet. The last two have the nape, back, and under parts grey-blue. These elegant birds haunt lofty mountain-woods until cold weather comes on; they are comparatively tame, feed on leaves, shoots, roots, fruit, worms, and insects, and lay—at least in the case of *C. manchuricum*—from twelve to sixteen drab eggs. The plumes are worn by Tartar and Chinese warriors.

Lobiophasis bulweri of Borneo is a splendid bird with maroon nuchal collar and chest, brown remiges, white tail, and black plumage elsewhere with blue margins to most of the feathers. The stiff spine-pointed rectrices number twenty-eight in the hen and no less than thirty-two in the cock, the whole tail being compressed and the median plumes decurved; in the male the skin of the naked front of the head is blue, as are two caruncles present behind the ears, two smaller processes on the lores, and two wattles at the gape. The rufous, buff, and black female has only the sides of the face bare, with diminutive lateral wattles on the throat. This species skulks in the jungles, and prefers running to flying, having many of the habits of a fowl, though ranging up to two thousand feet; the eggs are stone-coloured.

The magnificent Firebacks (*Lophura*) have, so far as is known, similar habits to the members of *Gennaeus*, though they are stronger on the wing, and utter mellower notes in their forest retreats;

the tail is vaulted, the cheeks exhibit patches of rugose blue skin—red in *L. diardi*—while the male has a pair of spurs and an erect crest with bare-shafted plumes. *L. nobilis* of Borneo is purplish-blue with fiery chestnut rump-region, golden lower breast, black head, throat, and wings, the four median rectrices being entirely buff and the lateral black with buff markings; *L. vieilloti* of Siam, the Malay Peninsula, and Sumatra has the lower breast black, and the two middle rectrices white, *L. ignita* of China differing in its chestnut-spotted flanks; *L. diardi* (*praelata*) of Siam, Cambodia, and Cochin China has a grey and black mantle, neck, and breast, a golden buff lower back, and crimson-tipped rump-feathers. The females have the mantle red-brown or chestnut, and outer rectrices of the latter colour in *L. vieilloti*, but black in *L. nobilis*; in *L. diardi* the black wing-coverts have wide buff bars. This sex of *L. ignita* seems to be unknown. *Acomus* has naked cheeks, but no crest or wattles; the tail is vaulted, and a pair of spurs is found in both sexes. *A. erythrophthalmus* of the southern Malay Peninsula and Sumatra is chiefly purplish- or bluish-black with fiery golden lower back, rich buff tail, and white wing-markings; *A. pyronotus* of Borneo exhibits white shaft-stripes on the breast; *A. inornatus* of West Sumatra, of which the male only has been discovered, has black plumage margined with dark blue-green, therein somewhat resembling the hens of its congeners, which are black glossed with purplish-blue. In habits this genus apparently resembles *Lophura*.

Lophophorus contains four gorgeous species of almost unsurpassable brilliancy, among which the Monal, constantly misnamed the Impeyan Pheasant, is best known. The tail is rounded, each metatarsus is provided with a spur in the male, and bare blue skin surrounds the eye. The Himalayan Monal (*L. refulgens*) has a crest like that of the Peacock, uniform in colour with the purplish-green head; the neck is purple, coppery, and green, the mantle golden-green, the lower back white, and the tail chestnut; the wing- and tail-coverts being green or purple with blue and green reflexions, the under parts black, and the remiges dusky. Its habits differ somewhat from those of other Pheasants, a preference being shown for grassy hill-forests not far from the snow-line; it roosts in trees, though generally found on the ground during the day, and is not very wild, trusting to its speed of foot in open spots, but readily taking to wing in the wood-

lands. The flight is rapid and powerful, while the male is said to soar without perceptible movement of the pinions; the usual cry is a loud melancholy whistle. The long stout beak serves to dig up roots for food; but grain, fruit, grass, and insect-larvae are also eaten. The nest, or sheltered unlined excavation in the soil, contains from four to six oval cream-coloured eggs, closely spotted or blotched with reddish-brown. The cocks are reported to be non-pugnacious, and the hens semi-gregarious while breeding. *L. impeyanus* of South Kashmir, the true Impeyan Pheasant, differs in its golden-green lower back and under parts; *L. l'huysi* of Sze-chuen and Koko-Nor has an ordinary crest, and white spots on the blue, green, and black tail; *L. sclateri* of North-East Assam has a curly crown with no crest, and white-tipped rectrices; the two latter forms being black beneath and white on the lower back. The slightly-crested females are black, buff, and white; the lower back is black and buff in *L. refulgens*, whitish mottled with brown in *L. sclateri*, and white in *L. l'huysi*.

Of Tragopan (*Ceriornis*) there are five species, remarkable for the fleshy blue horn above each eye and the large gular wattle in the male, who erects the former and inflates the latter when courting. The fore-part of the head and throat are naked or merely hairy, while the crested cock-bird possesses a pair of short spurs, rarely present in his mate. *C. satyrus*, the "Horned Pheasant" of the Central and Eastern Himalayas, has the crown and throat black, the occiput, neck, and lower parts orange-red with stiff chest-plumes, the back brown, the remiges and rectrices black and buff. Most of the body-feathers exhibit black-margined white spots, and the outer wing-coverts additional red marks; while the wattle is orange barred with blue. *C. melanocephalus* of the Western Himalayas has a longer crest tipped with red, none of that colour on the occiput, the breast black and red, and a purple wattle with flesh-coloured sides, blue margin and spots. *C. temminckii* of Central and South-West China has the crest and under parts red, the wattle blue barred marginally with red, and the characteristic spots grey without black rings. *C. blythi* of North-East Assam and Manipur has the wattle yellow tinged with blue, and a plain grey breast; whereas *C. caboti* of South-East China has the latter region buff. The hens are black and buff with whitish spots. These shy solitary birds occupy the higher hill-forests, being apparently

monogamous, though found in small companies at times; they run slowly, take refuge in trees, and fly with a whirring sound. They roost aloft, but feed constantly upon the ground, eating grubs, insects, roots, flowers, fruits, and especially seeds or herbage: the note is a deep monotonous "bellowing" or "wailing sound." The fleshy excrescences are said to be chiefly developed in the breeding season, when the male, who possibly assists in incubation, struts before his consort like a Turkey. A nest is

FIG. 47.—Cabot's Tragopan. *Ceriornis caboti*. $\times \frac{1}{6}$. (From *Nature*.)

sometimes formed of twigs, grass, and feathers to contain the seven or eight whitish eggs with dull lilac spots or red freckles. Tragopans are mistakenly termed "Argus" by sportsmen in India.

In *Ithagenes*, or Blood-Pheasant, the bill is short and stout, the tail fairly long and rounded, the plumage soft and acuminate; the orbits are naked and red, and each metatarsus is armed with two or more spurs, generally absent in the female. *I. cruentus* of the Eastern Himalayas and Tibet has a full buff crest, black forehead and lores, lead-coloured back and wings, brownish remiges and rectrices with white tips to the latter, and a green

wash on the wing-coverts and rump. The cheeks, throat, and much of the upper and under tail-coverts are crimson, the breast is yellow-green with crimson streaks. *I. geoffroyi* of East Tibet and West China has a grey head and throat; *I. sinensis* of Mongolia and North China is similar, with rufous for green on the wing-coverts. Females are grey, brown, and buff. Found in flocks of twenty or thirty at altitudes between ten and fourteen thousand feet, these bold birds have limited powers of flight, great speed of foot, and a weak cackling note; they bury themselves occasionally in the snow, as do certain Grouse (p. 238), and feed on grass, insects, berries, and shoots of juniper or pine.

If a Sub-family *Perdicinae* be admitted, it may be commenced[1] with the little known *Ophrysia superciliosa* of North-West India, a soft-plumaged greyish-brown species with black and white markings on the head; next to which comes *Gallo-perdix,* the Spur-Fowl, with a large bare eye-space, and two or three spurs on each foot in the male, reduced to a single pair in the female. *G. spadicea* of India, which has been introduced into Madagascar, has a brown crown, and chestnut plumage elsewhere, with grey margins to the feathers, and black vermiculations on the wing-coverts and rump; the female being mottled with black. *G. lunulata,* another Indian form, has the crown black with white streaks, the breast buff with black spots, and black-ringed white ocelli on the mantle; *G. bicalcarata* of Ceylon has both mantle and crown black with white stripes, and the breast whiter. These birds frequent thick jungles near the coast, or hills up to seven thousand feet, and are extremely wild, though hard to flush; they resort to trees in emergencies, and roost in them at night; the note is a harsh or plaintive whistle; the food consists of grain, insects, and their larvae. Four, five, or even ten whitish or buff eggs are deposited on a few dry leaves below some sheltering shrub. The cocks are stated to fight as viciously as Jungle-Fowl. *Bambusicola fytchii,* the Bamboo-Partridge, found from North-East India to China, has the crown and ear-coverts red-brown; the upper parts olive-brown, varied in places with black and buff, and longitudinally marked with chestnut, except towards the rump; the wing- and tail-quills reddish mottled with buff; the superciliary stripe, throat,

[1] Mr. Ogilvie Grant begins with *Excalphatoria.* Cf. *Cat. Birds Brit. Mus.* xxii. 1893, pp. 94-95.

and breast buff, the chest brown with chestnut and white blotches, the flanks spotted with black. *B. thoracica* of South China and *B. sonorivox* of Formosa have grey superciliary stripes, and the latter grey ear-coverts. The females only differ from the males in rarely possessing a pair of spurs. These species do not form coveys, but haunt long grass and bamboo-thickets on the hills, being difficult to put up, and uttering screaming noises; they readily challenge their neighbours to fight, roost in trees, and lay from seven to twelve creamy-brown eggs under shelter of a tussock or bush. *Ptilopachys fuscus* of the northern Ethiopian Region has brown plumage with white margins, and vermiculations or darker barring in many parts, the mid-breast being buff and the naked orbits red. The sexes are similar. Small parties or pairs frequent rocky hill-sides up to nine thousand feet, and are very pugnacious; they carry the tail folded, as do domestic fowls, have a sharp call-note and lay whitish eggs.

In *Excalphatoria* the short tail of eight soft feathers is entirely hidden by the coverts. *E. sinensis*, the Chinese or Painted Quail, the smallest of the Phasianidae, is brown above with black marking and rufous streaks, a bluish shade appearing in places, and chestnut patches shewing on the wing-coverts; the throat and sides of the neck are black and white, the black forming a central patch below the chin; the remaining lower parts are slate-blue with a median chestnut patch on the breast. It is found from India and Ceylon to Formosa, and in Celebes; a darker race occupying the Philippines, many of the Malay Islands, and Australia. *E. lepida* of New Britain, New Ireland, and the Duke of York Islands has no chestnut on the wing, and little below; *E. adansoni*, of Africa south of lat. 5° N., is slaty-brown above, and has chestnut scapulars, wing- and tail-coverts with grey shaft-stripes. The females have white throats and rufous breasts barred with black. The Australian form, or Least Swamp-Quail, abounds in marshes, the Indian frequents dry ground as well, the coveys being composed of single broods, which feed mainly upon seeds. The flight is very brief, the nest a mere pad of grass, on which lie five or six olive-drab eggs, scantily spotted with purple or red-brown. *Synoecus australis*, the Swamp-Quail of Australia, Tasmania, and South-East New Guinea, is reddish-brown and grey above, with more or less distinct black mottlings; the throat is whitish, the under

surface is buff, with black chevrons in younger birds. The female lacks the grey tints, and is more coarsely barred with black. Gould describes the habits and call as resembling those of the Common Partridge, but they are better exemplified by those of *Excalphatoria*, while the eggs vary from ten to fourteen, and are creamy or greenish-white, generally closely freckled with brown. *S. raalteni* of Timor and Flores has a rufous throat.

Of the true Quails six species may be admitted. *Coturnix communis*, the Common Quail, though essentially a migrant in the north, ranges throughout Europe, Asia, and Africa, and breeds not uncommonly in Britain, having also been introduced into the Eastern United States; while another African race (*C. capensis* auctt.) only differs in its reddish throat. The crown is dark brown with a light streak down the centre and above each eye; the upper parts are brown and black with buff longitudinal stripes, becoming mottlings on the remiges; the throat is white with a black median patch connected with the ear-coverts by two upcurved lines: the breast is reddish-buff, the abdomen yellowish-white, the flanks are mottled or barred with brown. The short tail of ten or twelve feathers lies entirely below the coverts. The hen-bird has black pectoral spots and a perfectly white throat. *C. japonica* of East Asia and Japan, occasionally found in Bhutan and Burma, has a plain brick-red throat, the sides of which and the chin exhibit lanceolate feathers in the female. Hybrids between this species and the Common Quail occur where their ranges overlap; individuals, moreover, present great variation. *C. coromandelica* of India and the Burmese countries, *C. delegorguii* of the Ethiopian Region, *C. pectoralis* of Australia and Tasmania, and the nearly extinct *C. novae zealandiae* of New Zealand, have the outer webs of the primaries uniform brown in both sexes; the males of the first two have the throat as in *C. communis*, with a black patch on the breast, and buff and chestnut under parts respectively; the third has the throat plain brick-coloured; and the fourth still brighter red. The females have no throat-mark, the hen of *C. delegorguii* being blackish-brown above, and that of *C. pectoralis* shewing black chest-bands, which in *C. novae zealandiae* cover most of the feathers. That Quails can traverse long distances is evidenced by the migration of large flocks in spring and autumn; but, as a rule, their flight is short, and they rise with great reluctance, though with considerable

velocity. The trisyllabic note of the male is rendered "wet-my-lips" by country-folk; the food consists of seeds, slugs, and insects, sought among the grassy flats in general frequented. From seven to fifteen yellowish or white eggs, with dark brown blotches or marblings, are deposited in a hollow lined with bits of herbage, in standing corn or grass, the hen sitting very closely and feigning lameness to draw attention from the young. The male appears to be usually monogamous, while the broods or "bevies" do not form coveys. Two of these broods are said to be occasionally reared in a season, but how far such statements are due to the destruction of the first complement of eggs must remain doubtful, as in the case of so many other birds that breed on the ground.[1]

Melanoperdix nigra, of the Malay Peninsula, Borneo, and Sumatra, is glossy black with browner primaries, the female being chestnut, with black markings and a whitish chin. It inhabits the lowlands and lays five eggs. *Rollulus roulroul* is a most remarkable form with a frontal tuft of long black bristles. In the male the fore-part of the head is black, separated by a white band from the full hairy crest of maroon, which covers the occiput; the upper parts are dark green glossed with blue, the wing-coverts being maroon, and the quills brown and buff. The tail and under parts are black, a blue tint shewing on the breast; the base of the black bill, the feet, and the naked orbits are scarlet. The female has a blackish head with moderate crest, a grass-green body with chestnut wing-coverts edged with maroon, and a black bill. These birds inhabit the dense forests of the Malay Peninsula, Tenasserim, Siam, Borneo, Sumatra, and Java, up to an altitude of a few thousand feet; they hunt in small parties for seeds, berries, and insects, are very shy, quick of movement and hard to flush, and utter a mellow whistle. *Caloperdix oculea* of similar range to *Rollulus*—unless we separate *C. borneensis* with more chestnut throat—has the crown, neck, and under parts rufous-chestnut, the back and tail black with crescentic white anterior and reddish posterior markings, the wing-coverts brown with round black spots, the quills brown and buff, the face and throat buff, a white supra-aural stripe, and black flanks with whitish bars. The male is only distinguished by possessing a pair or two of spurs. This bird haunts dense uninhabited forests, and eats insects, seeds, and berries. *Haemat-*

[1] For more details, see art. Quail, Dresser, *Birds of Europe*, vii. 1878, pp. 143-154.

ortyx sanguiniceps, of the mountain-forests of Northern Borneo, is brownish-black; the slightly-crested head, the throat, upper breast and under tail-coverts being crimson with black tips to the last-named, and the metatarsi possessing three pairs of spurs. The rump-feathers have partly expanded shafts. The female has the throat rufous, the upper breast deep chestnut, and no spurs. *Arboricola* contains nearly twenty species with almost naked throats, ranging from Northern India to the Indo-Chinese countries, Borneo, Sumatra, Java, and Formosa. The following may be taken as examples of this genus, the sexes being usually alike. *A. torqueola* of the Himalayas has a chestnut crown, red, black, and white nape, olive and black upper parts, varied with chestnut and buff on the wings, black cheeks, throat, fore-neck, and superciliary stripe, a white line down the sides of the throat, a white band surmounting the grey breast, and grey flanks with chestnut and white markings. In the female the crown is brown and black, the throat, cheeks, and so forth, rufous with black spots, the chest-band rusty-red. *A. ardens* of Hainan, of which the male only is known, is easily recognised by the peculiar shining orange-scarlet patch of stiff hair-like feathers on the fore-neck. *A. javanica* of Java has the head rufous with brownish crown, a black band surrounding the eyes and crossing the occiput, another encircling the base of the neck, joined to the former by a black line down the rust-coloured nape, and a third running from the throat to the sides of the neck. The upper parts are dark grey barred with black, the wings exhibiting chestnut and olive tints; the chest is grey; the remaining lower parts are chestnut. *A. chloropus* of Lower Burma and Cochin China has the crown and nape brown, the superciliary stripe, throat, and lores black and white, the fore-neck buff with black spots and margin, the upper parts and chest brown and black with rufous on the wings and rump-region, the breast red, the abdomen, sides, and black-barred flanks buff. In this genus the orbital and even the gular skin is crimson or purplish, the feet are commonly red, the bill rarely so. The various species form coveys, which frequent grassy hill-jungles and wooded ravines up to more than ten thousand feet; they are usually unsuspicious, and run before an intruder, but occasionally perch in trees, and fly rapidly when forced to rise; the single whistling note is loud but mellow; the food consists of leaves, roots, berries, seeds, grubs, and molluscs; the four white eggs, some-

times speckled with grey, are deposited with little or no nest, at the foot of a tree, or under a tussock among thin scrub.

Microperdix and *Perdicula*, the Bush Quails of Anglo-Indians, have a blunt tubercle on each foot in the male. *M. erythrorhyncha* of South and West India has the crown and cheeks black: a white frontal band continued down the sides of the head; brown upper parts, with round buff black-centred spots on the back, and black and buff markings on the wings and tail; a white throat bordered by black; and a grey-brown chest and rufous breast, with black spots on the former and the flanks. The bill and feet are red. In the female the crown is brown, the throat and cheeks being rufous. *M. blewitti* of Central India is only slightly different; but *M. manipurensis* of Manipur has a chestnut throat, becoming grey in the hen. These active Quail-like little birds haunt the lower mountain-thickets up to perhaps eight thousand feet, forming small coveys, feeding on seeds and insects, and fashioning a slight nest under some sort of cover, to contain from ten to fourteen pointed creamy-brown eggs. *Perdicula asiatica* of India and Ceylon is brown above, with wavy black dorsal barring, and black and buff markings on the wings and tail; the superciliary stripes and throat are chestnut with whitish margins; the under parts white with black bars; the feet red. The female is uniform buff below. *P. argoondah* of India has dull brick-red in place of the chestnut, and a whitish throat in the hen. It has been introduced into Mauritius. The habits are much as in *Microperdix*, but the nest is sometimes more elaborate, and the reddish-white or olive-coloured eggs, with possibly a few faint spots, number from five to seven. *Margaroperdix madagascariensis* of Madagascar, imported into Mauritius and Réunion, has a black head with reddish-brown sides to the crown, a white stripe from above each eye running laterally down the neck, two others from the gape down the margin of the throat, rufous and black upper parts, with buff bars upon the wings and rump-region, and white shaft-streaks except upon the quills. The red-brown chest and black under surface are both margined with grey, and the latter is spotted with white; the flanks are chestnut, black, and white. It is called "Tro-tro," "Timpoy," or "Tsipoy" by the Malagasy, and inhabits grassy hills, flying rapidly for short distances, and laying from about fifteen to twenty eggs. Natives say that if

you break these eggs you cause the death of your father, if you spare them that of your mother![1]

The genus *Perdix* contains the Common Partridge (*P. cinerea*), so valuable for purposes of food and sport, of which it is needless to describe the plumage; yet attention may be drawn to the dark chestnut horse-shoe mark on the grey breast, nearly obsolete in most adult females, and the broad ruddy bars on the sides and flanks. The hen may be invariably distinguished by wide-set buff bands on the black scapulars and adjoining wing-coverts, which in the cock are light brown with black vermiculations and chestnut blotches. The latter sex, moreover, has grey instead of brown sides to the neck.[2] Great variation is noticeable in the coloration, specimens from dry soils exhibiting the richest hues, while some are occasionally obtained with a white "horse-shoe" mark, and a particularly dark variety has even been denominated *Perdix montana*. Hybrids are recorded with the Red-Legged Partridge and Red Grouse, but such are quite exceptional. Unknown in Shetland, the Partridge has been introduced with moderate success into the Outer Hebrides and Orkneys; but in the Highlands of Scotland the character of the country is often unsuitable, nor is the bird very plentiful in Ireland. From Scandinavia it occurs southward to the Douro valley and Naples, though rarer in Northern Europe, and choosing higher ground than the Red-legged species in the south; eastward it reaches through Asia Minor and Persia as far as the Altai Mountains. Pairing even in February, it does not nest until about April, the numbers of individuals reared being naturally much affected by subsequent excess of wet or drought. The better the cultivation the larger the stock, though grassy heaths, gorse-coverts, tangled hedge-rows and thickets also provide excellent harbour. Very rarely do Partridges desert the open for woods, or perch in trees, though during the hot hours they shelter in fields of turnips, clover, and so forth, emerging at other times to feed on the grain, seeds, leaves, and insects found among short vegetation or stubble. Cover is naturally eschewed when wet. They often trust to their powers of foot for escape, or crouch motionless upon soil that matches their plumage, while the whirring noise with which they rise is familiar to all, as is their heavy rapid

[1] Grandidier, *Histoire de Madagascar*, xii., Paris, 1879, pp. 489, 490.

[2] Cf. Ogilvie Grant, *Cat. Birds Brit. Mus.* xxii. 1893, p. 188.

flight at starting, and their easy gliding motion afterwards. The well-known crowing note is most commonly heard towards evening. The nest, a circular cavity lined with grass, is placed among short herbage, often near a road, the drab-coloured—or, exceptionally, bluish—eggs varying from nine to twenty or more in number. Both parents tend the young and employ many devices to mislead an intruder; at night the family parties roost upon the ground, and later in the year pack into larger coveys. The methods of sportsmen and poachers cannot be discussed at length in our limited space, but the general adoption of driving, instead of shooting over dogs—due to improved systems of farming—should not be left unnoticed.

P. daürica (*barbata*), of Asia east of the Altai and Tian-shan Ranges, exhibits lanceolate feathers on the sides of the throat, like *Coturnix japonica*, and a black "horse-shoe" mark on the golden-buff breast; the latter part in *P. hodgsoniae*, of South Tibet and the extreme north of India, being white with wide bars and a large basal patch of black; *P. sifanica* of North-West China and North Tibet lacks the black patch, and has less black on the sides of the head and throat. The two last-named birds reach the snow-line at about eighteen thousand feet; the first of them at least having a nest and eggs like the Common Partridge. *Rhizothera longirostris*, of the Malay Peninsula, Borneo, and Sumatra, has long sharp curved beak and powerful whitish metatarsi, provided with a pair of stout spurs in each sex. The upper plumage is rich brown with black and buff markings; a grey shade pervades the neck and lower back, and chestnut tints the cheeks, throat, and wings; the under parts are grey, merging posteriorly into buff. The hen has a chestnut fore-neck, and is less grey above. *R. dulitensis* of Borneo is similar.

The genus *Pternistes* contains the naked-throated Ethiopian Francolins. *P. nudicollis* of South Africa is brown above with black shaft-stripes, the mantle being greyer, the superciliary stripes and face black, the sides of the neck and lower parts black with white streaks. The female has a grey and rufous chest, the male a pair of sharp spurs. The bare orbits and throat are crimson, the bill and feet orange-red. *P. humboldti* of East Africa and *P. afer* (*rubricollis*) of western South Africa resemble the above, but have two pairs of spurs. *P. cranchi* differs in having the neck, mantle, and under surface

mottled with black and white, the breast and abdomen shewing chestnut markings; in the similar *P. boehmi* the naked throat is yellow. These two species occur west and east of Lake Tanganyika respectively; the female being less black and white above and less chestnut below in the former, while the sexes are alike in the latter. *P. swainsoni* of South Africa is distinguishable by its rusty abdomen with black and chestnut blotches, the latter colour being absent in the hen; *P. rufipictus* of East Equatorial Africa has white neck-feathers, margined with brown and black. *P. leucoscepus* of North-East and the darker *P. infuscatus* of East Africa exhibit broken stripes of brown and white down the whole body, with yellowish-red orbits and throat; the sexes are alike save for the spurs in the male. In many districts the members of this genus, as well as the Francolins proper, closely akin to them in appearance and habits, are denominated "Pheasants." They haunt grassy places and brushwood, often on hills near water; the coveys feeding in the open on bulbs, seeds, berries, and insects, and roosting upon trees, preferably those that are leafless. Flying little, but running at a great pace, they utter harsh notes in the morning and evening, and lay six or more creamy or pinkish eggs, frequently with chalky spots, in a grass-lined cavity sheltered by coarse herbage.

Francolinus, inclusive of *Ortygornis, Scleroptila, Chaetopus,* and *Clamator* of some writers, contains forty or more species, ranging over the Ethiopian Region, and from Arabia, Cyprus, and Asia Minor to Persia, India, and South China. The coloration is rich and varied, and the sexes are commonly alike, while hybrids undoubtedly occur. Apart from a special study, a general idea is given by the following descriptions. *F. vulgaris*, the "Black Partridge," ranging from Cyprus, Palestine, and Asia Minor to Assam, formerly occurred in Spain, Italy, Sicily, Greece, several of the Mediterranean Islands, and North Africa.[1] It has the whole plumage blackish, with buff markings on the crown, wings, and mantle, white ocelli on the upper back and flanks, white barring on the lower back and tail, a white patch below the eye, and chestnut collar and under tail-coverts. The bill is black, the feet are orange with a small blunt spur. The collar of the brownish female is confined to the nape, and the throat is white. In *F. levaillanti* of South Africa, the "Redwing" of English

[1] See Lilford, *Ibis*, 1862, pp. 352-356; Dresser, *Birds of Europe*, vii. pp. 123-128.

colonists, both sexes have the crown brown, edged with black and white, which continues down the nape and widens at its base; a black and white band outlines the throat and forms a patch below it, while the rest of the head is rufous. The upper parts are black, brown, and buff, with pale chestnut remiges; the under parts are of the last colour, varied with buff and black, and barred with brown on the flanks. Spurs are occasionally wanting. *F. adspersus* of western South Africa is very distinct, both male and female being brown above, with fine black and grey mottlings and black lores; the head, neck, and lower surface are white, with narrow black bars. The spurs are long and sharp. *F. albigularis* of West Africa is grey-brown, with rusty crown, white throat, buff under parts, and bright bay patches on the wing-coverts, the upper back and neck exhibiting white streaks edged with black. The lower back is blotched with black, the spurs are moderate.

Of some five Asiatic species, *F. sinensis*—introduced into Madagascar, Mauritius, and Réunion—alone reaches eastward of Assam to China; whereas *F. pondicerianus* has been imported into Rodriguez and the Amirante Islands.

Francolins are found in family parties rather than coveys, and prefer localities near water, though these may consist of rushy swamps, cultivated lands, stony slopes, or maritime plains. Dry situations are, however, favoured, a sufficiency of cover being the chief requisite, and an altitude of six thousand feet being occasionally attained. Some forms roost upon the ground and apparently never perch, others—especially in South Africa—resort habitually to trees at night or when disturbed; but probably the style of country and the amount of persecution account for this difference, while the decrease of the commoner species in certain parts emphasises the fact that they are an easy prey to gunners and other foes. These birds run with great rapidity, and are extremely difficult to flush, still more so for a second time; when forced to rise they do so with a whirring noise, and fly off heavily but swiftly, to pitch again as soon as possible. Reposing in the shade during the hot hours, they feed in the morning and evening, at which times the loud, shrill cry of three bell-like notes, or the "hysterical laugh," may be heard in all directions. The diet consists of insects, shoots of plants, berries, seeds, and bulbs, the powerful bill being used for digging. The well-concealed nest resembles that of a Partridge, the six to fourteen eggs, found in

autumn as well as spring,[1] are olive-brown or buff, occasionally with small brown spots or a few white shell-markings.

Ammoperdix bonhami of South-West Asia is a desert form of an isabelline colour, with blue-grey crown and throat, black forehead and superciliary stripes, white lores and ear-coverts, a few black markings near the rump, chestnut hues on the tail and flanks, and longitudinal black bars on the latter. *A. heyi*, ranging from Nubia to the Jordan Valley and the Persian Gulf, has no black on the head, the frontal band being white, and the cheeks and mid-throat chestnut. The rufous and buff females of the two species are indistinguishable. They inhabit wastes and stony ravines up to four thousand feet, in pairs or small coveys; crouching, to avoid detection, on the ground, which matches their colour; flying like Quails; and uttering a reiterated double whistle. The eight to twelve eggs, of a plain drab tint, are deposited among stones or under tussocks, with hardly any nest.

Caccabis rufa, the Red-legged or French Partridge, introduced into England from France, and inhabiting Western Europe generally from Belgium and Switzerland to the Balearic Islands, Corsica, Elba, and South Italy, occurs in the Atlantic Islands, but not in Africa. The crown is grey, a black band outlines the throat and reaches past the eyes to the forehead, the upper parts are reddish-grey or brownish, and the tail is partly chestnut. The abdomen is bright buff, the chest grey with black margins to the feathers; chestnut, white, and black stripes adorn the flanks; the bill, feet, and orbits are red. The male is only distinguishable by having rudimentary spurs. *C. saxatilis*, the Greek Partridge, has the chest plain and the flanks without white. It inhabits the Alps, Apennines, Carpathians, Balkans, and Sicilian hills; the eastern race, *C. chukar*, ranging from the Ionian Islands to Aden, Persia, Mongolia, and China, and being naturalized in St. Helena. *C. magna* of Tibet shews a double gorget of black and reddish. *C. petrosa*, the Barbary Partridge, has a chestnut crown and collar, with white spots on the latter; it occupies North-West Africa, Sardinia, several of the Canary Islands, and Gibraltar. *C. spatzi* of South Tunis differs slightly. *C. melanocephala* of South-West Arabia has a black crown, bluish upper parts, flanks marked with black and white,

[1] The nest is occasionally in a shrub, Hume, ed. Oates, *Nests and Eggs of Indian Birds*, iii. 1890, p. 435.

and a black mark down the fore-neck. The members of this genus frequent cultivated country, grassy desert-hills, and scrub-covered ground, up to sixteen thousand feet; they are unsuspicious in quiet parts, but such is not the case in England. They run and fly far and fast, but are exceptionally hard to flush, trusting almost entirely to their feet, and occasionally when hard pressed resorting to trees. The loud note may be syllabled chuk-chuk-chukar-chukar: the food consists of leaves, fruits, seeds and insects; the nest is a scantily-lined excavation, containing from seven to fourteen yellowish-white eggs with reddish specks or blotches. The pugnacious males are used by the Cypriots to attract their wild kindred; but in Britain they have been said —probably in error—to drive away the Common Partridge.

Tetraogallus tibetanus, the Tibetan "Snow-Cock" or "Snow-Pheasant," is dark grey above, with buff markings towards the wings and rump, and black vermiculations; the under parts are white, with a grey pectoral band and black streaks posteriorly. There is a yellowish naked patch behind the eye, the bill is orange, and the feet are red. The sexes are similarly coloured, but the male has a pair of strong blunt spurs. The range extends from East Turkestan to West China, where *T. henrici* occurs, with a grey chest. *T. himalayensis*, found from the Himalayas to the Hindu Kush and the Altai Mountains, has the pectoral band and a patch on each side of the head and nape chestnut, the chest white with black bars, the orbits yellow, the bill dusky, and the feet orange. *T. caspius*, extending from the Taurus to Transcaspia and South Persia, has the upper breast grey with black spots, and lacks the chestnut on the head; *T. caucasicus* of the Caucasus has the occiput and nape rufous, and the chest black and buff; *T. altaicus* of the Altai range has the last spotted with white, but no white bases to the secondaries as in the two preceding forms. These large active birds haunt stony hill-sides above the forest-zone and near the snow-line, being gregarious, yet keeping in pairs; they are wild and wary, fly straight and swiftly, utter shrill whistles or cackling notes, and feed upon insects, buds, roots, grass, moss, and fern. From six to nine yellowish or olive eggs with reddish or purplish spots, generally one-third larger than those of the Capercaillie, are laid in a hollow in the soil, sheltered by a stone or overhanging tuft.

Tetraophasis obscurus of East Tibet is in both sexes brownish-

grey above, with blackish markings anteriorly, olive tints on the mantle, and buff on the wings; the throat and some blotches on the flanks are chestnut, the breast is grey with black spots, the abdomen grey and buff, the tail mainly black and white. The male has two stout spurs. *T. széchenyii* of Central Tibet has the throat fawn-coloured, and the whole of the under parts blotched with chestnut. The habits are apparently somewhat similar to those of the last genus. *Lerwa nivicola*, the "Snow-Partridge," ranging from the Himalayas to Western China, has black upper parts with white cross-bars, which become rufous buff on the mantle and wings; the under surface is chestnut, with black and white markings only shewing towards the belly. A pair of spurs distinguishes the cock from the hen. This species inhabits broken grassy or heathery sides of mountains in the midst of snow, up to an altitude of at least fourteen thousand feet; it is tamer than the Snow-Pheasant, flies equally well, and nestles under jutting rocks. The coveys feed on moss, seeds, and insects, and utter a short double Grouse-like note or a harsh whistle.

Sub-fam. 4. *Odontophorinae*,[1]—The "American Partridges," are Quail-like birds, rarely attaining the size of a Red Grouse, and readily distinguished from their kin by the doubly-toothed mandible and the lack of spurs. The sexes are alike, if not otherwise stated.

Of some four species of *Dendrortyx*, ranging from South Mexico to Costa Rica, *D. macrurus*, of the former country, has a black head and throat, with a long white streak above and below each eye, and a rufous tip to the short, full occipital crest. The neck and back are chestnut and grey; the rump, wings, and tail are browner with black mottlings; the breast is greyish with rufous streaks. The bill, feet, and naked orbits are coral-red. *Callipepla squamata*, of the South-Western United States and Mexico, has a grey-brown head, with white-tipped crest and buff throat; the wings, rump, and tail are brownish-grey with white inner margins to some of the scapulars and secondaries; the mid-breast and belly are fawn-coloured. The remaining plumage is grey, with black margins to the feathers which cause a scaly appearance, and shews dusky triangular spots beneath. *Oreortyx pictus* of the Western United States possesses two very long black occipital plumes; olive-brown upper parts with white edges to the scapulars and outer secondaries; slaty head, neck,

[1] For further details cf. Gould, *Monograph of the Odontophorinae*, London, 1850.

and lower surface, with chestnut throat and abdomen, of which the former is laterally margined with white; a white band from the chin to the lores: and chestnut flanks, barred with black and white. *Lophortyx californicus*, of the same countries, has the head and crest of two club-shaped feathers black, a yellow forehead, olive-grey upper parts, a black throat outlined with white, buff mid-breast, and chestnut belly, each feather of the last two being edged with black. A white band connects the eyes and continues behind them, while white streaks grace the sides and flanks. The female lacks the black and white pattern on the head, and has whitish lower parts with yellow-brown throat. Two other species extend the range to Mexico. *Philortyx fasciatus* of South Mexico has an olive-brown upper surface, washed with rufous on the crown and the greyer neck and mantle, and barred or blotched with black and buff on the lower back, wings, and tail; the blackish crest is tipped with red; the throat and lower parts are white, with a few median spots and pronounced black bars on the chest, sides, and flanks, where the feathers have rusty margins. *Eupsychortyx cristatus* of Curaçao and Aruba has half a dozen congeners, ranging through Central and northern South America. It has a buff crest, crown, and throat; black and white nape and cheeks; reddish-grey upper parts mottled and blotched with black and buff; and rufous lower surface, barred with black, and spotted on the chest, sides, and flanks with white. In the female the black on the head is replaced by buff. *Ortyx virginianus* of the Eastern United States is rufous and grey above with black blotches, the crown is blackish, the sides of the head are transversely striped with black and white, the white throat is margined with black, the lower parts are reddish-white with black chevrons. The hen-bird has a buff throat, and shews little black on the cheeks. This genus contains eight members, often called Colins, which range as far south as Mexico and Cuba. The three species of *Cyrtonyx* extend from the Southern United States to Guatemala; they all have full crests, highly-developed wing-coverts, and very short, soft tails. The sides of the head and neck exhibit a peculiar black and white pattern, while those of the body are grey, ocellated with white or varied with chestnut. The females lack the pattern on the head. As an example, *C. montezumae* is rufous above, barred with black, and streaked with buff and white; the breast being chiefly

chestnut and the abdomen black. *Dactylortyx thoracicus* of Central America has brown upper parts, with black blotches and rufous and buff mottlings; the superciliary stripes, cheeks, and throat are chestnut, with a black patch on each side of the last; the under surface is reddish-grey with white shaft-stripes. In the hen the chestnut is replaced by whitish. The crest is not so full as in *Odontophorus*, of which some fourteen species extend from South Mexico to Bolivia and South Brazil. *O. guianensis*, ranging from Panama to Bolivia and Amazonia, has the head and throat mainly chestnut, the neck and mantle grey, the lower back reddish-brown—all except the grey portions being marked with buff and black; the mid-throat is grey, the under parts orange-brown, with dusky barring on the chest and sides. The naked orbits are reddish; the bill is black, the feet are rather lighter, as in the Sub-family generally. *Rhynchortyx spodiostethus* of Veragua and Panama has the crown brown, the rest of the head chiefly rusty-red, the mantle grey and brown, the lower back buff relieved by grey and black, the wings more chestnut, the lower parts dark grey, with white and buff centres to the throat and breast respectively, and black-barred flanks. *R. cinctus* of Veragua has a rufous chest and olive-brown cheeks.

As an instance of the habits we may take *Ortyx virginianus*, called Bob-white from the shrill triple whistle of the male, which resembles "Ah-bob-white." It is a wary denizen of open woods and pastures, found in coveys, and roosting on the ground, though habitually taking refuge in trees, where it crouches upon the branches. It runs very swiftly, but rises, when hard pressed, with a whirring noise to fly for a short distance. The food consists of succulent shoots, seeds, berries, acorns, beech-nuts, and insects; the nest is imbedded in grass or placed at the foot of a tree, and is made of a little herbage, which may even arch over it; the white or drab eggs number from nine to eighteen. The male is said to assist in incubation, two broods being occasionally reared in a season. The female utters a clucking sound, and will feign lameness when with her brood.

Other forms prefer pine-forests, rocky ground, or dry sandy flats overgrown with cactus and sage-brush; their cries being in some cases louder or more guttural, while the eggs may be blotched or spotted with reddish-brown. Nests have even been recorded low down in trees. *Ortyx virginianus* has been intro-

duced into the West Indies and the Old World, though unsuccessfully in the latter; *Lophortyx californicus* into Europe, the Sandwich Islands, and New Zealand, in the last two of which it is firmly established. In America, moreover, some species seem to have lately extended their range. Hybrids are occasionally found.

Sub-fam. 5. *Tetraoninae.*—*Bonasa umbellus*, the Ruffed Grouse, which inhabits the greater part of North America, is remarkable for the frills of black or chestnut feathers surmounting a bare space on the sides of the neck, and for the partially naked metatarsi. Both sexes are rufous or greyish above, with buff and black markings, a short blackish crest, and a black subterminal tail-bar: the under parts being buff, relieved by brown and white. Great variation, however, is shown, and sub-species may be easily differentiated. When undisturbed, the "Pheasant" or "Partridge," as it is variously called by local sportsmen, is tame, and prefers undulating wooded country in the neighbourhood of cultivation, though it is also found in proximity to the hills. The habits resemble those of the following species, but the food is somewhat more varied, and includes beech-nuts, chestnuts, and acorns. In spring the cock often struts upon some log, and drums after the manner of other American grouse; but the habit is not confined to that season, nor is the sound produced by inflated neck-sacs, but by the wings. The absence of the hens, moreover, suggests that the performance is not amatory. From eight to fourteen or more eggs are laid, of a whitish or buff colour, with or without round reddish spots. *B. sylvestris*, the Hazel Grouse—the Gelinotte of the French—is a smaller and darker bird, with white markings on the wings, and a black throat surrounded by a white line, which reaches to the forehead. There is no ruff, and the female differs from the male in her whitish throat. It inhabits hill-forests in Europe and Asia up to three thousand feet, extending southward to Northern Spain, North Italy, Transylvania, China, and Japan, but not occurring in Britain. The food consists of shoots and buds of birch and hazel, seeds, berries, and other fruit, worms, insects, and their larvae. The flight is noisy, but not protracted, the birds resorting to trees and squatting on the branches. The usual note is a melancholy whistle, followed by a chirping sound. The slight nest contains from six to fifteen yellowish eggs, spotted with a little rufous, which are deposited early in spring, as is commonly the case in the Family. *B.*

griseiventris and *B. severtzovi* are the representative forms in the Government of Perm in Russia, and the districts from Koko-Nor to South Mongolia respectively. The Old World species, sometimes denominated *Tetrastes*, are monogamous, and do not "drum."

Different races of *Pediocœetes phasianellus*, the well-known "Prairie Chicken," occupy America as far southwards as North California, New Mexico, Wisconsin, and Illinois. Both male and female shew black, red-brown, and yellowish tints above, with white streaks on the scapulars and spots on the wings, the lower surface being white with dusky markings. The short tail, with two elongated, but truncated median rectrices, gives it the name of Sharp-tailed Grouse. This shy denizen of the woods and prairies extends almost to the Arctic barren grounds in spring, that season being remarkable for the conduct of both sexes, which meet to hold regular dances on elevated spots, aptly compared to the "hills" of Ruffs. No doubt the cocks are the chief performers, but they are said to be monogamous, though their actions resemble those of their polygamous allies. The flight is strong and rapid, with alternate periods of flapping and sailing; the note is a triple whistle or a "cack-cack-cack." The food includes shoots of plants, grass, berries, and insects, the last-named being the chief diet of the young, as in the case of many other American Grouse. About fourteen eggs are deposited in a cavity scraped amidst rank herbage, and but slightly lined; their colour is brownish with darker spots, or occasionally creamy with marks of red.

Centrocercus urophasianus, the Sage-Cock of the Western United States and the adjoining portions of British America, has the upper parts mottled with black, grey-brown, rufous, and buff, the lower parts black, relieved by a white chest. The tail is long and wedge-shaped, with attenuated feathers; the sides of the neck and lower throat possess stiff spiny plumage, and the former bare orange air-sacs, as in the species next to be mentioned. The female lacks the black spots on the white throat. This bird, the largest of the New World Tetraoninae, is generally unsuspicious, and runs ahead of the traveller uttering cackling or clucking notes; when hard pressed it rises with fluttering action, and flies off rapidly to a considerable distance. The food consists chiefly of "sage-brush" (*Artemisia tridentata*), but other leaves and flowers, seeds, berries, grain, and insects vary the fare. The habits at the mating-time resemble those of *Dendragapus* and

Tympanuchus, while the eggs, from seven to seventeen in number, may be found placed in an excavation of the bare soil, or resting on a slight lining; they are drab or olive in colour, with roundish brown spots. What seems to be the ground colour is easily rubbed off before incubation commences, a fact noticeable in other Galline birds and Plovers. The Sage-Grouse reaches a considerable elevation, as does the sage-brush, which gives its name to the bird.

Tympanuchus americanus, the Prairie-hen, found in the districts drained by the Mississippi and its confluents, and thence northwards to Ontario, is brown above, barred with buff and black, and chiefly paler brown below, marked with white. The small crest is tipped with white, and a tuft of long, stiff, black feathers covers the inflatable yellow air-sacs on the sides of the neck, the sacs being absent and the tufts shorter in females. In spring parties assemble after daybreak on dry knolls, and conduct their love affairs after the fashion of the Dusky Grouse (p. 236), a booming noise being audible from afar, and the skin of the neck being expanded below the erected tufts. The cocks are most pugnacious when the pairing-time is nearly over. Shoots of plants, berries, grain, acorns, and insects constitute the food. The flight is powerful and rapid, but individuals often run and squat. For a Grouse the nest is considerable; and from eleven to fourteen, or even twenty, creamy or olive-coloured eggs are deposited, with very small reddish-brown spots. *T. cupido*, the Heath-Hen of the eastern United States, now only found on the island of Martha's Vineyard, off Massachusetts, has smaller neck-tufts of pointed feathers, and more conspicuous whitish marks on the scapulars. *T. pallidicinctus*, the Lesser Prairie-Hen, ranging from Texas to Kansas, is barred with brown, margined on each side with black.

Dendragapus obscurus, the Dusky, Blue, or Pine-Grouse of the Rocky Mountain districts, has black upper parts mottled with grey and a little brown, and pure grey under surface; the female having a considerable admixture of buff, and the male possessing air-sacs like those of *Tympanuchus*. A darker race, *D. fuliginosus*, extends the range to Sitka and California. Another northern form, which lacks the broad grey tail-band, is termed *D. richardsoni*. These birds frequent wooded ravines up to nine thousand feet, preferring the neighbourhood of water, and feeding as do their allies. The characteristic booming noise, common to this species and others, may be heard throughout the day in spring, the male

choosing some horizontal bough or convenient spot of ground whereon to display himself with drooping wings, expanded tail, and inflated air-sacs. Rarely can an observer gain a view, so misleading is the ventriloquistic effect of the sound. The nest, commonly placed beneath a branch or near a tussock, is a mere depression in the soil lined with herbage, leaves, or fir-needles. The eight to twelve eggs are creamy-buff, with round brown dots.

Canachites (*Canace*) *canadensis*, the Canada Grouse or "Spruce-Partridge," found from Alaska and British America to the north-eastern United States, is black, with lead-coloured bars above, and a white pectoral band below, the tail having a chestnut tip, which is wanting in the browner *C. franklini* of the north-western Rocky Mountains. In the female the grey is chiefly replaced by orange. It is a tame species, and flies but a short distance before alighting on some tree. The food consists of "spruce" buds and larch needles, with berries of *Vaccinium* (bilberry, cranberry, etc.), *Empetrum* (crowberry), and so forth. It is not polygamous; but a most curious account of the cock's habits of showing off and drumming is given by Bendire.[1] The hen constructs a nest of dry moss, leaves, and twigs upon the ground, under shelter of some overhanging bough, and lays from eight to eighteen reddish-buff eggs with brown spots. *Falcipennis hartlaubi*, a very similar species, distinguished by slender sickle-shaped outer primaries, occurs in North-East Siberia, Kamtschatka, and Saghalien.

Tetrao urogallus, the Capercaillie, apparently not uncommon in Scotland until 1770, and exterminated in Ireland about the same date, was reintroduced at Taymouth Park, Perthshire, in 1838, and is now fairly plentiful in Central North Britain. Failure has attended similar attempts in Ireland. The discoveries of bones in Teesdale and near Torquay shew that this bird's range once extended to Yorkshire and Devonshire, while similar finds have been made in Aquitaine and Denmark. At the present day it inhabits sub-alpine pine-forests from Scandinavia, the Pyrenees, North Italy, and Greece to Lake Baikal and the Altai Mountains, being represented in the Urals by a sub-species, *T. uralensis*. The male is almost entirely blackish-grey above, with somewhat darker tail, and black below with greenish chest. The female is smaller, and is mottled with brown, buff, black, and white, merging into rufous on the breast, which is barred with black. A variable

[1] *Life Histories of N. Amer. Birds*, Special Bull. i. U.S. Nat. Mus. 1892, pp. 52-56.

amount of white occurs beneath in both sexes. The brown hair-like feathers on the legs are longest in winter, a fact true also in the Ptarmigan and elsewhere. A cross between the hen Capercaillie and the Black-Cock is known in North Europe as the Rackelhahn (*T. medius*).[1] The "lek" or "spel," as the love-performance is called, has been described in detail by many authors;[2] it takes place in spring, and occasionally in autumn, when the excited male struts with drooping wings and erect outspread tail before the assembled females, uttering curious noisy cries, to which they reply with softer plaintive notes. He is said to be deaf during the "play." At times he takes up a position on some lofty bough with the evident intention of challenging his rivals, who quickly respond to the provocation; ere long they join in combat upon the ground, leaping and rushing upon one another in their blind rage, and using bills, wings, and claws as weapons of offence. The flight of the Capercaillie is heavy though strong. The food consists chiefly of young pine-shoots, which are apt to give the flesh a flavour of turpentine, but includes berries, insects, and worms. About a dozen yellowish-white eggs, freckled with dull orange, are deposited in a hole scraped for the purpose near the foot of a tree, a slight lining being sometimes added. *T. parvirostris* (*urogalloïdes*) of North-East Siberia, with comparatively slender bill and purplish-green head, and *T. kamtschaticus* of Kamtschatka, are distinguished by their white-tipped scapulars.

Lyrurus tetrix, the Black Grouse, called according to the sex Black Cock or Grey Hen, ranges over Europe north of the Pyrenees and Apennines, as well as through Northern Asia to the Tian-Shan Mountains and Pekin. It inhabits the wilder moorlands of the north and west of England, being much less plentiful in the Midlands, and very rare in the east. It has, however, been introduced into Norfolk, and unsuccessfully into Ireland, while it has been restored to Surrey, Sussex, and Berks, and still occurs in Wilts, Dorset, Hants, Somerset, Devon, and Cornwall. In Scotland it frequents most suitable districts, but does not reach Orkney, Shetland, or the Outer Hebrides. The male, remarkable for his lyrate tail with its outwardly curved rectrices, is black with steel-blue reflexions, exhibiting a little brown in parts,

[1] For hybrids of grouse, cf. Meyer, *Unser Auer Rackel und Birkwild*. Vienna, 1887; and Millais, *Game Birds and Shooting Sketches*. London, 1892.

[2] Cf. Lloyd, *Game Birds of Sweden and Norway*, London, 1867; and Millais, *op. cit.*

a white bar on the wing, and white under tail-coverts. The female is rufous and buff, barred and spotted with black, and shewing but little white. This bird is usually found on broken ground or in open woodlands, where it conceals itself among long heath, bracken, or grass. The polygamous cocks meet at dawn in spring to fight for the hens, parading before them in great excitement with depressed outspread tails, while uttering a drumming or cooing noise. At other times the call-note is loud and clear. The flight is powerful but heavy; the food includes berries, seeds, grain, shoots, buds, and insects. The nest is merely a scantily-lined hollow, situated at the foot of a tree, or in heather and the like, often near plantations. The six to ten eggs have a yellowish ground-colour, with scattered orange-brown blotches, the markings being larger than in the Capercaillie. In some winters these Grouse allow themselves to be snowed up, as occasionally do other species. *L. mlokosiewiczi* of the Caucasus has the rectrices only slightly curved, and black under tail-coverts. Hybrids between the Black Cock and the Willow Grouse are called Riporre in Scandinavia.

Lagopus scoticus, the Red Grouse or Muirfowl, the only bird entirely confined to our islands, differs from its congeners in never becoming white in winter. It varies considerably in coloration,[1] but is usually considered a local form of the Willow Grouse (*L. albus*) of the north of Europe, Asia, and America. The male in both summer and winter is more or less chestnut-brown above, with black markings and a reddish head; the lower parts are similar, but are usually spotted with white. In autumn the brown of the upper parts becomes buff, and the lower surface is barred with buff and black. Mr. Ogilvie Grant[2] recognises three types of plumage in the male, a red form with no white spots, from Ireland and Western Scotland; a blackish variety comparatively rarely found; and another largely spotted with white below or even above. Intermediate specimens constitute the bulk of our birds. The female exhibits, moreover, a buff-spotted and a buff-barred form; but in summer she is typically black above with concentric buff markings, and buff below with black bars. Her autumn plumage, which continues throughout the winter, is black, spotted with buff and barred with rufous. Little need be said of the habits of this well-known species, nor will space allow of a description of the methods of killing it by driving and so forth; but it may be

[1] T. E. Buckley, *P.Z.S.* 1882, pp. 112-116. [2] *Cat. Birds Brit. Mus.* xxii. 1893, p. 36.

observed that it utters a clear ringing note, as well as the familiar "cok-cok-cok," and feeds upon grain and tender shoots of ling (*Calluna*) and heather (*Erica*), besides other plants. The nest of moss, grass, and the like is placed amidst heather, and contains from six to ten, or even more, yellowish-white eggs, thickly blotched and spotted with fine red-brown, purplish, or black. In England the Red Grouse is found as far south as Derbyshire and Shropshire, in Wales to Glamorgan; while unsuccessful attempts

FIG. 48.—Red Grouse. *Lagopus scoticus.* $\times \frac{1}{4}$.

have been made to introduce it into Surrey and elsewhere. In Ireland it is rather thinly distributed, but in Scotland it reaches the Orkneys, and an occasional brood has been known to be reared in Shetland, where a few pairs were turned down between 1858 and 1883. It has also been acclimatized in Southern Sweden. *Lagopus albus*, the Willow Grouse of Northern Europe, Asia, and America, termed the "Dal-riporre" in Scandinavia, is completely white in winter, except for the lateral rectrices, which are chiefly black; in summer it resembles the Red Grouse, but is distinguished by the white wing-quills. The female is smaller. The habits

are similar to those of the last-named, but a preference is shewn for willow- and birch-scrub; shoots of these trees or of *Vaccinium*, with various moorland berries, furnishing the food. A performance recalling the "lek" of the Capercaillie is said to be given by the male in spring, a fact also true of the succeeding species.[1] *L. mutus*, the Ptarmigan or Fjeld-riporre, is in summer blackish-brown with grey and rufous markings, the median tail-feathers, abdomen, and most of the wings being white. The back becomes grey in autumn. The female is reddish-buff, barred with black. In winter both sexes are white, with black and white rectrices, and in the male with black lores. Nearly all the so-called Ptarmigan in English poulterers' shops are Willow Grouse. The haunts are on the higher parts of mountain-ranges, where stony ground abounds, but somewhat lower altitudes are sought after the breeding season. The food consists of shoots and berries; the cry is croaking, and best heard in misty weather. From five to ten eggs, with blacker markings than those of Red Grouse, are deposited in a hole scraped in the earth, with little or no lining, the nest being commonly quite exposed, though equally often under shelter of a boulder. Ptarmigan are decidedly difficult to see among the similarly-coloured stones. In Scotland they occur on most of the higher hills from Arran northwards, though no longer in Dumfries and Galloway; while abroad they occupy Northern Europe, with the Pyrenees and the Alps, and possibly Northern Asia. In the lighter *L. rupestris* the adult male never has a black breast or a grey back in autumn. This form occurs in North Asia and North America, with Greenland, Iceland, and Japan, many local races having been described as distinct species or sub-species; while the larger *L. hyperboreus* (*hemileucurus*), with a white base to the tail, inhabits Spitsbergen; and *L. leucurus*, with entirely white rectrices—the smallest member of the genus—ranges along the Rocky Mountains from British Columbia to New Mexico.

Of fossil forms *Coturnix* and *Palaeortyx* occur in the Upper Eocene of the Paris Basin, *Taoperdix* in the calcareous deposits of Languedoc of the same age; *Palaeortyx* is again found with three species of *Palaeoperdix*, in the Middle Miocene of France, while *Phasianus* is not only recorded from

[1] Cf. Elliot, *Monograph of the Tetraonidae*, New York, 1872; Dresser, *Birds of Europe*, vii. 1871-81, p. 187. To these books and those mentioned in the note on p. 237, the reader must be referred for fuller details regarding the Tetraoninae.

this formation, but from the Upper Miocene of Oeningen and the Pliocene of Attica, in the latter of which *Gallus* accompanies it. *Meleagris* has been discovered in the Miocene of Colorado, and the Post-pliocene of New Jersey; *Gallus* in the Pliocene of France, *Palaeotetrix* and *Pediocoetes* in that of Oregon; and, finally, bones of *Lagopus* have been brought to light in the French Plistocene, and those of *Tetrao urogallus* at Kent's Hole near Torquay and in the caves of Teesdale in England.

Fam. VII. **Opisthocomidae.**—The curious and highly specialized Hoatzin (*Opisthocomus cristatus*) has been the subject of much discussion among systematists, as the outcome of which it is necessary to adopt for it a special Sub-Order Opisthocomi. Buffon classed it with the Curassows, P. L. S. Müller and Gmelin placed it in the Linnean genus *Phasianus;* but Illiger recognised a genus *Opisthocomus,* while Huxley and Garrod fully admitted its claim to higher rank than that of a Family. The habits are to some extent Ralline, and certain points of structure indicate a considerable affinity to the *Cuculi.*

The sternum is utterly unlike that of any other species, the anterior portion of the keel being aborted, and the posterior correlated with a flattened area of thick naked skin, on which the bird mainly rests. These modifications are no doubt connected with the extraordinarily large crop, which is supported by the furcula and the fore-part of the breast-bone, being received in a cavity of the pectoral muscles; the whole organ is decidedly muscular, and contains two divisions with a partial constriction between them. The body is long and thin, the bill is strong with basal serrations on the maxilla; bristles surround the gape, and the eye-lids have distinct lashes—a rare fact among birds. The reticulated metatarsi are fairly stout; the toes are long; the hallux being unusually developed and the claws slightly curved. The short rounded wings have ten primaries and nine secondaries. The nearly even tail is elongated, with ten stiff feathers. The plumage in both sexes is olive above with white markings, and dull rufous below; the long loose crest and the tip of the tail are yellowish, and a patch of bare bluish-black skin surrounds the eyes. The tongue is sagittate, the furcula is Y-shaped and ossifies anteriorly with the coracoids, an aftershaft is present, the down of the adults is sparing, while a small amount —of a reddish-brown colour—is observable in the newly-hatched

young. The syrinx has one pair of muscles inserted on the distal end of the trachea.

The Hoatzin or "Anna," which is about the size of a Pigeon, ranges from Colombia to the Lower Amazons and Bolivia, where it haunts the sides of lagoons, creeks, and rivers covered with a thick growth of low trees or bushes, which project over the stream or the mud left bare by the tide. In these tangled solitudes it skulks during the heat of the day, while at other times it may be observed squatting upon the branches, mainly supported on the patch of hardened skin already mentioned. When disturbed the bird flies off awkwardly for some forty yards with a violent flapping motion, or progresses by leaps from bough to bough, erecting its crest and expanding its wings and tail. The note is sharp and shrill, and has been described as a hissing screech. The food consists of leaves and fruit of the prickly *Drepanocarpus lunulatus*, of the Aroid *Montrichardia arborescens*, of *Avicennia nitida*, and of a species of *Psidium*. The conspicuous nest, placed on low trees or shrubs, is a loose platform of spiny twigs and sticks with a softer lining, which contains from three to five yellowish-white eggs of a Rail-like appearance, spotted with reddish-brown and lilac. The young, which can see and run as soon as they are hatched, have a claw on both index and pollex, by means of which they creep about the thickets and hook themselves over the branches, assisted by the bill and feet. They can also swim and dive. A strong musky odour is given off by the adults, whence they are termed "Stinking Pheasants" in Guiana. The male has been asserted to be polygamous.

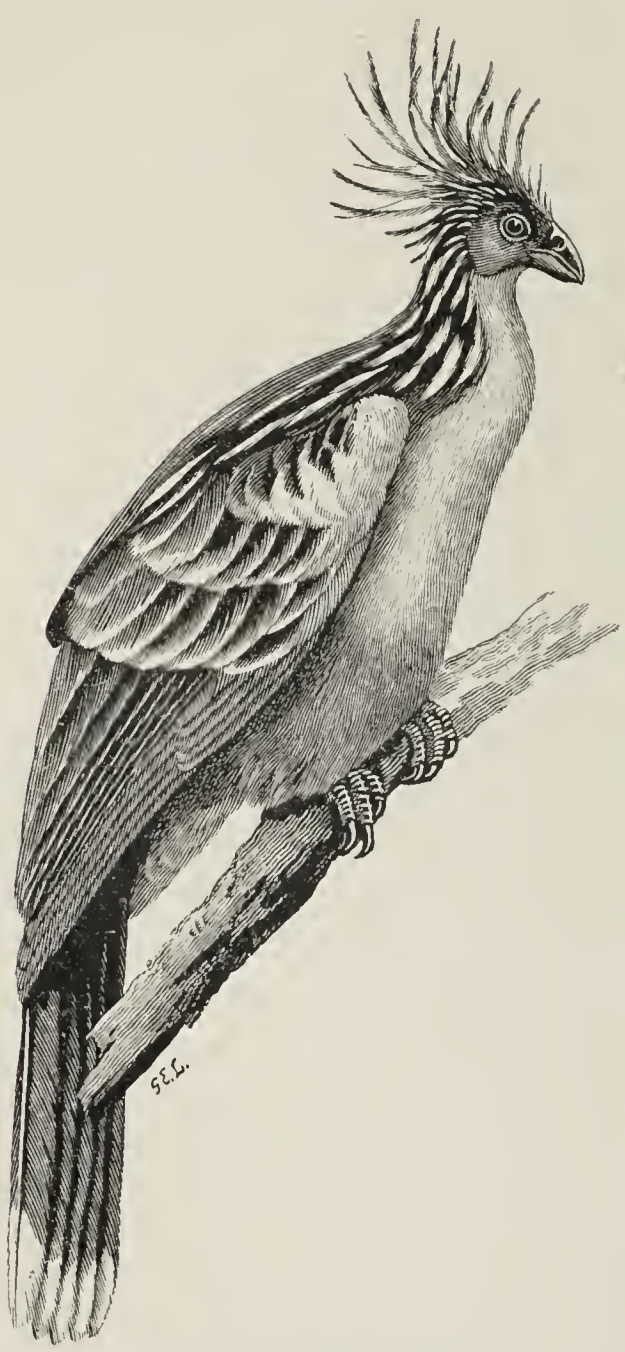

FIG. 49.—Hoatzin.
Opisthocomus cristatus. $\times \frac{1}{5}$.

Order X. GRUIFORMES.

The Gruiformes, which lie between the Galliformes and the Charadriiformes, compose a somewhat heterogeneous Order, which includes forms so different as the *Rallidae* (Rails), *Gruidae* (Cranes), *Aramidae* (Limpkins), *Psophiidae* (Trumpeters), *Cariamidae* (Seriemá and Chuñia), *Otididae* (Bustards), *Rhinochetidae* (Kagu), *Eurypygidae* (Sun-Bitterns), and *Heliornithidae* (Finfoots). Of these a large number are Waders, but the Land-Rail, the Wekas, the Kagu, the Bustards, and others, cannot be classed in this category. All agree in having no true crop, a tracheo-bronchial syrinx, and an elevated hallux; while the front toes are never completely webbed, though nearly so in *Heliornis;* the nares, moreover, are pervious, except in *Rhinochetus.* In the last-named the condition of the newly-hatched young is unknown, in *Heliornis* they are said to be naked at first, but in the remainder of the group they are covered with simple down. In structure the nine Families differ widely, a fact which would seem a strong argument against combining them under one head; but the aggregate of such points must be considered, and in any linear system the relationships within every Order cannot possibly be equally close. The present arrangement does not differ greatly from that adopted by Mr. Sclater,[1] wherein he accepted the names *Alectorides* and *Fulicariae,* used by Nitzsch, but made the former to consist of the *Aramidae, Eurypygidae, Gruidae, Psophiidae, Cariamidae,* and *Otididae,* and the latter of the *Rallidae* and *Heliornithidae.* Some writers, both modern and ancient, have placed the *Otididae* in the Limicoline group.

Fam. I. **Rallidae.**—The Rails constitute a somewhat generalized and very homogeneous Family, found in almost all parts of the world. The body is peculiarly compressed—enabling them to move with ease in dense vegetation—while the keel of the sternum is especially reduced in those flightless forms for which the group is remarkable. The strong bill varies in dimensions, being long in typical Rails, shorter and thicker in Crakes, decidedly curved in *Himantornis,* and reaching its maximum size among the Gallinules in *Porphyrio* and *Notornis,* where it is subconical. A horny shield is present upon the forehead in *Megacrex, Habroptila,* the Gallinules and the Coots, which is usually rounded or truncated

[1] *Ibis.* 1880, p. 408.

posteriorly, but is reduced to a point in *Porphyriops.* This excrescence is in most cases red, but is sky-blue, light green, or dusky in *Porphyriola,* green in *Tribonyx,* blackish in *Megacrex,* white, yellow, or brown in *Fulica.* The lower part of the tibia is bare; the anteriorly scutellated metatarsus is seldom short, though occasionally very stout; the toes are long and slender with the elevated hallux weakest; the claws are fairly long, curved, and sharp. Somewhat shorter digits are found in *Tribonyx* and *Pareudiastes, Fulica* has broad lobes of skin along the front toes, while *Porphyriops* and *Gallinula* have narrow entire membranous margins to them. The wings are generally short and rounded, with ten or eleven primaries, and from eleven to sixteen secondaries, all the feathers being obtuse; but in many species these members are imperfectly developed, and their coverts actually hide the quills in such cases as *Ocydromus* and *Notornis.* This retrograde tendency is clearly evidenced in the "Island Hen" of Tristan da Cunha (*Gallinula* or *Porphyriornis nesiotis*) and the "Mountain Cock" of Gough Island (*G. comeri*), which flutter along without flying; in the Moho of Hawaii (*Pennula ecaudata*), *Ocydromus* and *Notornis* of New Zealand, and *Habroptila wallacii* of Halmahera; not to mention *Eulabeornis, Porzanula, Nesolimnas, Cabalus, Pareudiastes,* and the extinct *Aphanapteryx, Aptornis, Diaphorapteryx,* and *Erythromachus.* In several flightless forms, as in the Dodo, the angle between the scapula and the coracoid is obtuse. The tail has from ten to fourteen rectrices, the usual number being twelve; these are short and usually soft, frequently with decomposed webs, and may be concealed by the coverts, as in *Megacrex, Amaurolimnas,* and *Pennula.* Its form varies from narrow and pointed to comparatively broad and rounded. A large caruncle rises behind the frontal shield in *Gallicrex* and *Fulica cornuta,* two knobs being found there in *F. cristata:* the wing, moreover, is often armed with a sharp spine. The nasal grooves are commonly long and deep; the pervious nostrils being in the hard sheath of the bill in Gallinules, and partially covered by a bony or horny growth in *Rallicula, Pareudiastes,* and *Thyrorhina.* The furcula is U-shaped, the tongue lanceolate, the aftershaft very small. Down is plentiful in both adults and young, that of the nestlings being commonly black, while the chicks of our Moor-Hen and Coot have the head adorned with red and blue. Rails, not being born blind, run from the shell, and swim at once.

Ralline birds are under ordinary circumstances non-gregarious, and inhabit tangled marshes or damp localities near rivers and lakes; but many, and especially the flightless forms, have a predilection for dry plains, as for instance *Pennula* of Hawaii, *Ocydromus* of New Zealand, *Cabalus* of the Chatham Islands, *Habroptila* of Halmahera, *Tricholimnas* of New Caledonia, and *Pareudiastes* of Samoa. *Crex pratensis* of the Palaearctic Region also haunts dry lands. *Fulica gigantea* occurs only on the lakes in the Andes of Chili, Bolivia, and Peru. Some species are partly crepuscular, and in Britain the Spotted Crake is certainly little heard except towards evening. Rails walk easily with bobbing head and jerking tail, while they prefer running to flying, as the flight is laboured and requires continuous action of the wings. As may be readily seen in the case of Coots and Moor-Hens, some difficulty is experienced in rising from water, the feet trailing along the surface for several yards; but, when once fairly launched in the air, the legs, which at first hang down, are drawn up below the tail, and a steady pace is maintained for considerable distances. Most species swim and dive with facility, and will even remain with only the bill above water; perching and climbing, too, are common habits. Generally speaking, the members of this Family are silent birds, though they may be constantly heard calling towards dusk; the more or less melancholy notes are less varied than in many other groups, but may be harsh and sonorous, or loud and clear. The groaning noise uttered by the breeding Water-Rail, the somewhat frog-like sound made by the Moor-Hen, the continuous craking of the Corn-Crake, the "cackling" of the Clapper-Rail, the shrill whistle of the Wekas, the rasping cry of *Ocydromus sylvestris*, the deep trumpeting of the Purple Gallinule, and the clearer call of the Coot are some of the most notable exceptions. The food consists of worms, molluscs, insects and their larvae, green herbage, tubers, roots of aquatic plants and seeds; *Porphyrio* and *Tribonyx* cause serious damage to potato-, rice-, and corn-crops: while the former bird is said to have a curious habit of holding the larger edibles in its claws and nibbling them like a Parrot. Some of the stronger species occasionally prey on mice, lizards, young birds, and eggs. The nest may be a large mass of aquatic plants or dry flags, as in the Coots, or a similar but smaller structure, as in the Gallinules; the former being commonly founded under water, though raised above it, whereas the latter is generally near the bank or—

exceptionally—at the height of a few feet in a tree or bush. Rails and Crakes make a more or less substantial fabric in sedges, grass, clover, and so forth, *Creciscus* and *Porzanula* a spherical mass with an entrance at the side; but *Parcudiastes, Cabalus,* and *Ocydromus* are stated to breed in most cases in burrows. *Gallicrex* occasionally fashions its nest on floating leaves, and the writer has seen a Moor-Hen's nest in a similar situation. The eggs, from two to ten or more in number, are generally white or cream-coloured with red-brown, olive, or blackish markings, and often with faint lilac spots; those of the Coot are stone-drab with small black specks; those of *Cabalus modestus* are white with a few indistinct rufous and grey flecks; those of *Zapornia parva* and *Porzana bailloni* are instances of a thick olive-brown mottling. The adults are stated sometimes to carry their young in their claws.

Exceptionally the plumage of the Rallidae is nearly black, as in *Limnocorax, Fulica,* and *Habroptila;* slightly browner, as in *Gallinula;* blue or greenish-blue as in *Porphyrio:* but the coloration is normally sober, with a tendency to olive, brown, or chestnut. This may be relieved by stripes of white, especially on the flanks; the under parts may be nearly red as in *Creciscus levraudi;* and both surfaces may be spotted with white as in the male of *Corethrura pulchra,* or flecked and barred with it, as in *Rallus maculatus.* The sexes are usually alike, but *Rallicula, Zapornia, Gallicrex,* and *Corethrura* are instances of the contrary.

Space, however, is wanting to give in detail a description of every form, which is the less necessary in view of their general similarity; but the following examples will enable a fair idea to be gained of the group.

Rallus aquaticus, the Water Rail of Europe and Central Asia, which winters in North-West India and North Africa, is olive-brown above with darker streaks, and lead-coloured below, the flanks being barred with black and white. The genus is found in most parts of the world, with the apparent exception of North-West Africa and the Australian Region. *Rallus elegans,* the King-Rail, *R. longirostris* (*crepitans*), the Clapper-Rail, and *R. virginianus* are well-known North American species, while *R. madagascariensis* is confined to Madagascar.

In *Hypotaenidia,* which ranges from India and South China to the Pacific Islands generally, the whole lower parts are barred with black and white, except in *H. striata* and *H. mülleri,* where

these markings are restricted to the sides and abdominal region, and in *H. brachypus*, where the belly is plain.

Cabalus modestus and *Nesolimnas dieffenbachi* of the Chatham Islands are curious little brown forms with no visible tail, closely allied to the next genus, which they resemble in being flightless, and apparently in general habits. *Ocydromus* contains the Wood-Hens, or Weka Rails, of New Zealand, of which *O. greyi* of the North Island is tawny above with dark shaft-stripes or bars, and grey below with fulvous fore-neck and sides. *O. earli* of the South Island is more cinnamon in hue; *O. australis*, also of the South Island, is less grey below, and usually has barred flanks; *O. fuscus* of the south-west of the South Island is blacker than the first-named; *O. hectori* is a paler race of *O. australis*. These Rails are semi-nocturnal, and sometimes excavate burrows, in which, or in the scrub, they pass much of the day: the localities preferred are dry woods, ravines, and sandy shores, *O. fuscus* obtaining the name of Kelp-Hen from the stretches of sea-weed that it frequents. This species feeds on sea-molluscs, but its congeners will eat young birds, lizards, caterpillars, worms, insects, and berries. The cry is a sharp whistle, often preceded by a growl, the birds being very tame when unmolested. They are pugnacious, inquisitive, and thievish, stealing articles from tents or houses, attacking fowls, or sucking their eggs. Their own eggs are from five to seven, both these and the nest, which is generally in a burrow, much resembling those of other Rails. *Ocydromus sylvestris*, of Lord Howe Island, is nearly uniform rufous above and brownish below, with barred wings and tail; it lays similar eggs upon the ground.

The dusky *Tricholimnas lafresnayi* of New Caledonia is remarkable for its soft hair-like plumage, and the purplish-brown and black *Gymnocrex rosenbergi* of Celebes for its bare yellowish orbits.

Aramides includes eight species found in Central and South America, of which *A. ypecaha* may be taken as a representative. It is olive-green above, with chestnut nape, black rump and tail, and greyish below with white throat and vinous belly; the bill is yellow, the feet are scarlet. Cautious when danger threatens, it is sufficiently audacious to attack poultry; among its native swamps it usually walks in stately style or struts on the branches of trees, though it can run quickly; while it lies closely when surprised on open ground, dashing up with the whirring flight of a Partridge. The alarm-note is powerful, unearthly shrieks being uttered

during both day and night. Companies are described by Mr. Hudson as meeting to dance about with expanded wings and open beaks.[1] Somewhat similar in colour to certain members of the last genus is *Megaerex inepta* of South New Guinea, one of the largest Rails known, which is usually seen running swiftly along water-courses; while the black *Habroptila wallacii* of Halmahera loves forests. The curious *Himantornis haematopus* of West Africa is brown, with black and rufous mottlings above, whitish throat, stout green and black bill, and red feet. *Dryolimnas cuvieri* of Madagascar, Mauritius, and Aldabra Island, and *Canirallus kioloïdes* of the first-named and West Africa must be briefly mentioned, as must *Rallina* reaching from India to North-East Australia, which has half a dozen small brown species, with chestnut on the head and chest, and black and white barring below.

Crex pratensis, the widely-ranging Corn-Crake or Land-Rail, extends from most of Europe to the north of Central Asia, wintering in Africa, and occurring accidentally in North America, or even Greenland and Australia. *Zapornia parva*, the Little Crake, *Porzana maruetta*, the Spotted Crake, and *P. bailloni*, Baillon's Crake, are somewhat similar British Birds, the two latter of which have bred in our islands, *P. maruetta* still doing so in some districts. This species is brownish-olive with white flecks above and below, grey belly, and flanks showing black and white bars. Of its dozen congeners, covering nearly the whole globe, *P. carolina*, the Sora Rail of North America, is particularly well-known. In the Ethiopian genus *Corethrura*, extending to Madagascar, the males are blackish, spotted or streaked with white, and have fine chestnut heads, necks, or even breasts, the female being dusky with rufous mottlings: in *Rallicula* of New Guinea the chestnut extends over most of the body. *Porzanula*

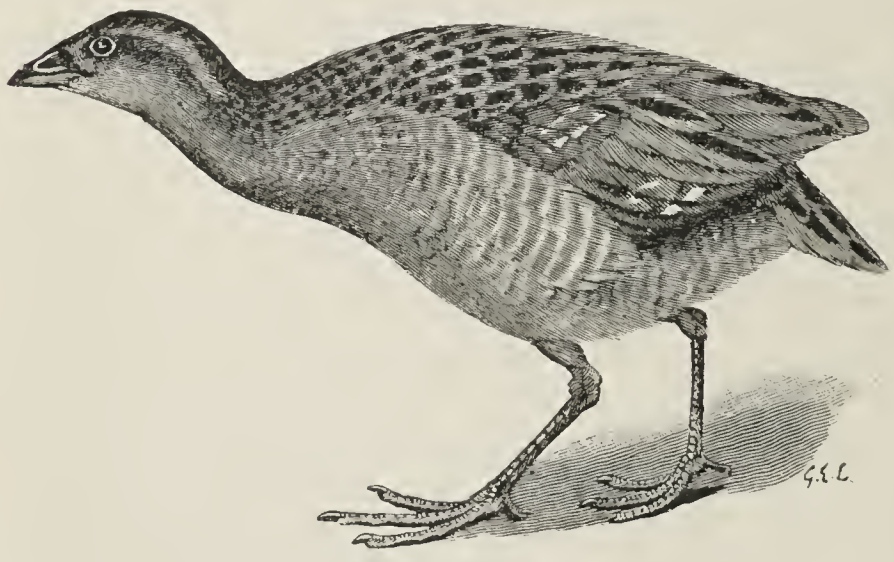

FIG. 50.—Land-Rail. *Crex pratensis*. $\times \frac{1}{4}$.

[1] *Argentine Ornithology*, ii. London, 1889, p. 153.

palmeri of Laysan, an interesting little flightless form with a soft chirping note, which the first discoverer caught with a hand-net, makes its nest under grass-tussocks. Closely allied to *Porzana* is *Creciscus*, a genus of a dozen species ranging from the United States to the Galápagos, Chili, and Paraguay; two at least of them being remarkable for building a spherical nest with a side entrance in coarse herbage or low bushes, while one is said to make a sort of ladder to reach a platform before its porch.[1] *Limnocorax niger* of the Ethiopian Region is a glossy black bird with red feet and greenish bill, which walks upon the leaves of water-lilies and such plants, like a Jaçana.

Amaurornis, inhabiting the Oriental Region and extending to New Britain, links the foregoing genera to the Gallinules. *A. phoenicura* is a dark greyish bird with white under parts and chestnut flanks, the other three species being duller.

Tribonyx mortieri, the "Native Hen" of Victoria, South Australia, and Tasmania, and *T. ventralis* of considerably wider range, are respectively ruddy- and olive-brown forms, with blackish tail and vent, slaty lower surface, and white flank-marks. They appear at times in flocks, which arrive and depart with equal suddenness, destroy the settlers' crops, strut about like fowls, and in many respects resemble Moor-Hens in habits, nests, and eggs. The legs are unusually powerful.

Gallinula extends over the greater part of both hemispheres, and is represented in Europe, Asia, and Africa by our common Moor-Hen (*G. chloropus*), dark olive-brown above and grey below, with white lower tail-coverts, white flank-stripes, red frontal plate, and scarlet garter on the tibia. *G. galeata* of most of the New World differs in the posteriorly truncated shield, but *G. sandvicensis* of the Sandwich Islands is barely separable. The smaller African *G. angulata*, *G. tenebrosa* of Australia and New Guinea, and *G. frontata* of the two last-named countries, the Moluccas and Borneo, complete the group; unless *G. pyrrhorhoa* of Madagascar and *G. dionysiana* of St. Denys be accounted distinct from *G. chloropus*. The flightless *G.* (*Porphyriornis*) *nesiotis* of Tristan da Cunha and *G. comeri* of Gough Island have already been mentioned. *Gallicrex cinerea*, the "Water-Cock" of the Indian Region, which reaches Japan, is dull black, with lighter edges to the feathers above, a yellow and red bill, and red frontal shield. A pinkish

[1] See Salmon, *P.Z.S.* 1879, p. 546, and cf. Durnford, *Ibis*, 1877, p. 193; 1878, p. 65.

fleshy horn springs from the forehead, said to become very small in winter, and to be wanting in the female, which is varied below with white and buff. It has a loud booming cry, and fights like a domestic Cock, but otherwise resembles the Gallinules in habits.

Porphyrio comprises some dozen fine species with blue plumage, found in Africa and Madagascar, and from the Mediterranean to South China and Polynesia; several individuals, probably escaped from captivity, being recorded from Britain. *P. caeruleus* (*veterum*) is purplish-blue above with blacker remiges and rectrices, and purplish-black below with bright blue cheeks, throat, and chest, and white under tail-coverts; the bill, shield, and feet are red. It is chiefly a Mediterranean bird, but reaches Mesopotamia. Others of its congeners are greener or blacker. The habits, nest, and eggs are like those of the Coot, whereas the next genus—in the writer's opinion inseparable—appears more akin in manners to the Moor-Hen. *Porphyriola alleni* occurs in Africa, with Madagascar and Rodriguez, and strays to the Canary Islands and South Europe; *P. martinica* ranges from Florida, Texas, or even New England, to the West Indies and Brazil; *P. parva*, from the last-named to Amazonia and Guiana. *Porphyriops crassirostris* and *P. melanops* occupy South America.

Notornis mantelli of New Zealand,[1] now probably extinct, was olive-green above with only a tinge of blue; the head, neck, and under surface being dark purplish-blue, the bill, shield, and feet red. It was practically a gigantic *Porphyrio* with very stout legs, short wings, and soft tail, which was unable to fly, but ran with great swiftness, being solitary and retiring. Its native name "Moho" is that also given to other Rails in New Zealand, and *Pennula ecaudata* in Hawaii; it therefore may only mean "Rail." The white *N. alba* of Lord Howe and Norfolk Islands certainly exists no longer.

Fulica includes twelve species, of which the majority are South American, though the genus extends over most of the globe; Polynesia possesses only *F. alai* of the Sandwich Islands, but three of the members reach Patagonia. *F. atra*, our grey-black Coot, with flesh-coloured bill, white shield and greenish legs relieved by an orange garter, ranges through Europe and Asia, and to North Africa and the Philippines southwards; its habits are well-

[1] Dr. A. B. Meyer considers the remains found in the North Island (*N. mantelli*) to be distinct from the South Island species, which he names *N. hochstetteri*.

known, while the lobed toes are noticed above. The smaller *F. lugubris* of Sumatra, Java, and Celebes is hardly distinct; the North American *F. americana* and the Australian *F. australis* are very similar: the Andean *F. gigantea* is extremely large; while the red frontal caruncles of the Bolivian *F. cornuta* and of the African and South-European *F. cristata* have already been mentioned.

Of fossil Rallidae an extraordinary number are found, ranging from the possibly toothed *Telmatornis* of the American Cretaceous rocks, *Gypsornis, Orthnocnemus, Elaphrocnemus,* and *Tapinopus* of the French Upper Eocene, and *Rallus* of both Eocene and Miocene of the same country, to *Fulica minor* of the Pliocene of Oregon. Of more recently exterminated forms we have *Tribonyx* (?) *roberti* from Central Madagascar, the long-billed flightless *Aphanapteryx broecki* and *Fulica newtoni* from the Mare aux Songes in Mauritius, *Porphyrio caerulescens* from Réunion, and the "Poule Rouge" (*Erythromachus leguati*) from Rodriguez. In New Zealand are found the large *Aptornis defossor* and *A. otidiformis,* with two species of *Notornis;* in the Chatham Islands *Diaphorapteryx hawkinsi* and *Ocydromus insignis*—all six flightless; in the latter islands, too, an extinct *Fulica* (*Palaeolimnas*) occurs, and in Norfolk and Lord Howe Islands *Notornis alba,* as above. Queensland furnishes *Porphyrio mackintoshi, P. reperta, Tribonyx effluxus, Gallinula strenuipes, G. peralata,* and *Fulica prior.* The Sandwich Islands may possibly yet contain *Rallus sandvicensis* and *Pennula ecaudata,* further instances of flightless species, but this is improbable.

Fam. II. **Gruidae.**—The Cranes are very old forms, superficially somewhat like Herons, and often confounded with them in local parlance—as is the case in Scotland and Ireland. They are among the largest of Waders, and are scattered over most of the globe, except the Malay islands, Papuasia, and Polynesia; but in the Neotropical Region they are mere migrants from the north, never found south of Mexico. Their headquarters are in North-East Asia, while America possesses only three species, and Australia one.

These long-necked and long-legged birds have a moderate bill, straight and rather compressed, which varies from slender to stout, with a lateral groove on each side of the mandible and nasal furrows about halfway down the maxilla; in *Balearica* this feature is comparatively short. The metatarsus is scutellated in front, reticulated behind: the tibia is partly bare: the toes are short and stout, the anterior being more or less connected at the base by a

membrane; the hallux is small, much elevated, and furnished with a sharp hooked claw. The wings are described by different writers as long or moderate, but are certainly ample and rounded, with about thirty-three quills, of which eleven are primaries; the decomposed inner secondaries exceed the last-named, and are either lanceolate and drooping, or broad and erectile, while in *Bugeranus* and *Tetrapteryx* they are extraordinarily extended. The short tail has twelve rectrices. *Anthropoïdes* has long silky auricular plumes, *Balearica* a bristly crest and a naked gular wattle, *Bugeranus* a feathered lappet on each side of the throat, *Antigone australasiana* a pendulous pouch, and most species, as will be seen below, a partly bare carunculated head. The tongue is lanceolate, the nostrils pervious; while, except in *Balearica*, the trachea of the adult is convoluted within the keel of the sternum, but enters it behind the clavicles,—which are often ancylosed with it,—and not in front of them, as in certain Swans, the development varying according to the species and the age. In *Anthropoïdes* the cavity of the keel is open laterally. The furcula is Y-shaped, the aftershaft is very small, the down is uniform in both adults and young.

Cranes are inhabitants of morasses and plains, being especially fond of the neighbourhood of lagoons, tanks, and fields of corn or rice; yet they are also found in boggy openings in forests, on sandy flats, or even on the sea-shore. They are gregarious after the breeding season, when they often collect into flocks of immense size, which pass the night together and traverse vast distances in company. The northern species all migrate southwards in winter. Erect and tall, they may be seen striding swiftly along with head thrown back, or strutting around their mates; while in spring they often stand in rows and proceed to stalk about in single file, or dance to meet one another with nodding heads, necks advanced, and wings widely outspread. Thereafter they bow towards the ground, jump in the air, and perform graceful antics of all descriptions. The chosen spot for these dances is commonly near water. The male courts his spouse in somewhat similar fashion, and twigs or feathers are often tossed in the air in sport, to be caught again ere they touch the ground. Rising from a level spot appears to be a difficult matter, the birds running awkwardly for a few yards, and labouring heavily with their wings to gain their purpose; when once in the air, however, the flight is steady and swift, with head

and legs outstretched, though this is varied by countless elegant evolutions and gyrations, as they rise higher and higher until they become mere specks in the heavens, and finally disappear from sight. The characteristic utterance is a harsh guttural or resonant trumpeting sound, uttered on the ground with the head thrown back and the bill open, or repeated incessantly at great elevations; but the Whooping Crane has a clear, piercing cry, the Asiatic White Crane a feeble but mellow whistle, and the Crowned Cranes a plaintive but fairly sonorous set of notes. The varying calibre of the voice has been thought to be connected with the convolutions of the trachea mentioned above, the young giving vent to a weak pipe or trill. Virgil's lines concerning the noise made before rain, and the flight, are well-known to Latin scholars. The food consists of grain, pulse, acorns, shoots, flowers, roots, tubers, bulbs, and the like, with the occasional addition of small mammals and birds, reptiles, amphibians, worms, insects, and even fish; the members of this Family, however, dislike wading, and only swim under compulsion. Feeding chiefly in the morning and evening, when they post sentinels, as Rooks do, they often stand or doze upon one leg, with the head drawn back upon the shoulders. Cranes, which are said to pair for life, return to the same breeding haunts annually, where they either construct a large fabric of reeds, rushes, and aquatic herbage, or use straw and small twigs for their nest. The conical pile, with its moderate depression on the top, is commonly placed in shallows, fresh materials being added if the water rises. Several species, on the other hand, merely scrape a hole in marshy ground, on dry plains, among standing corn or grass, or on sandy beaches, while occasionally reed-beds are selected. The eggs, two, or rarely three in number, are generally creamy white, olive-brown or buff, with reddish-brown, red, or purplish-grey spots and blotches; those of the Indian Sarus Cranes have a bluish- or greenish-white ground, while those of the Crowned Cranes are not uncommonly plain bluish-white. The male is said to incubate in some cases, and both parents tend the young carefully for a considerable time, though the latter run from the shell; the female sits with her head drawn in upon her shoulders, and is usually loth to leave her charge. When wounded these birds are very dangerous, fighting boldly with bill and wings. They are very palatable when fed on grain, the breast in particular

resembling beef-steak. Cranes are easily domesticated, and, in certain districts of India, in Japan, and among the Kalmuks, they are held in reverence, though elsewhere they are often killed for the sake of their decorative plumes.

Grus communis, the Common Crane of Europe and Northern Asia, which used to breed in Britain until the end of the sixteenth century, and reaches North Africa, India, and China on the winter migration, is ashy-grey, with white cheeks, nape, and sides of the neck, black primaries and inner secondaries; the crown being bare, with blackish bristles and red warty skin. *G. lilfordi* of East Siberia is a lighter race. *G. canadensis* is a smaller species, hardly different from *G. mexicana*, the "Sandhill Crane" of the United States, which is slaty-grey, with a brownish wash. *G. monachus*, another similar form from Eastern Asia, has all the head white except the bare portion. *G. nigricollis* of Koko-nor has the feathered part of the head, the upper neck, the wings, tail, and inner secondaries black; *G. japonensis* of North Eastern Asia is white, with grey-black throat and fore-neck, the dark colour extending to a point on the hind-neck. *G.* (*Limnogeranus*) *americana*, the Whooping Crane of the United States and Mexico, is pure white with black primaries, the bristly head, lores, and cheeks being bare, and covered with warty red skin. *G.* (*Sarcogeranus*) *leucogeranus*, the Asiatic White Crane, is entirely white, except for the black primaries, and has all the front of the head bare, the red skin extending beyond the eye, and showing a few scattered hairs. This bird ranges at certain seasons to South-East Europe. *G.* (*Antigone*) *collaris* of India and the Caspian is light grey, with brownish-black primaries, a white ring round the lower neck, and white inner secondaries; the grey-green crown is bare, the occiput and upper neck are red and papillose, with black bristles on the latter. The Burmo-Malay *G. sharpii* is distinguished by the absence of white; while both enjoy in common the name "Sarus." *G.* (*A.*) *australasiana*, the "Native Companion" of East Australia, has the neck feathered, and possesses a red and green gular pouch, covered with the same black hairs as the face, the general coloration resembling that of its congeners. *G.* (*Pseudogeranus*) *leucauchen*, the "Tan-cho" or national Crane of the Japanese, so often seen in their clever drawings, is grey, with white hind-crown, nape, throat, and inner secondaries; the rest of the wing-quills and the tip of the tail are black, the fore-

part of the crown and the cheeks bare, warty, and red, with black hairs. It is found westward to Lake Baikal, and southward in winter to the Yangtse basin. *G.* (*Bugeranus*) *carunculata*, the "Wattled" Crane of South Africa, is slaty-coloured, becoming blacker towards the tail, and browner towards the mantle; the cheeks and the whole neck are white, with elongated chest plumes;

G.E.L

Fig. 51.—Crowned Crane. *Balearica pavonina.* × $\frac{1}{8}$.

a lappet, with white feathering, hangs from each side of the throat; and the fore-part of the head is covered with bare red papillose skin. *G.* (*Tetrapteryx*) *paradisea*, the "Stanley" Crane of the same districts, is leaden blue, with black ends to the inner secondaries, and a white crown; the head is entirely feathered, and the chest plumes elongated as in the next species. *G.* (*Anthropoïdes*) *virgo*, the "Demoiselle" Crane, inhabits South Europe, and extends to Central Asia and North China, migrating to

Northern Africa and India in winter. It is silvery-grey, with white ear-tufts, black sides of the head, neck, chest, primaries, and tips to the inner secondaries. *Balearica pavonina*, the "Crowned" Crane of the northern Ethiopian Region, is greenish-black above and dark grey below, most of the feathers being lanceolate; the neck is delicate grey all round, the secondaries are chestnut—the inner being somewhat decomposed; white and yellow shew on the wing-coverts; a spreading tuft of twisted yellow and white bristles with black tips surmounts the occiput, while the sides of the face are bare—white above and pink below, and the throat is covered with black down. There is a very small throat-wattle in this form, but *B. chrysopelargus*, the "Kaffir" Crane of South Africa, has it much larger and chiefly red, differing moreover in its greyer plumage, and white cheek-patch with only a border of crimson above. In *B. gibbericeps* of East Africa, the bare skin of the face extends almost to the nape.

In Cranes the sexes are alike; but the young are browner, with rusty or buff tips to the feathers, or even with downy instead of more or less naked heads, as in adults. Immature birds lack the elongated plumes. The bill is usually greenish-grey, brown, or black, at times with a little red, but it is yellow in *Limnogeranus*; the feet vary from greyish- or bluish-black to dull green or flesh-colour; the iris is generally crimson, orange, or yellow.

The Upper Eocene of Hampshire furnishes the fossil *Geranopsis* as well as *Grus*, the Italian Eocene *Palaeogrus*, that of Wyoming four species of *Aletornis*; *Grus* occurs, moreover, in the Miocene of France, the Pliocene of Attica and the United States, while *G. primigenia* of the French and Italian Plistocene, with *G. melitensis* of the Zebbug cave in Malta, complete the list.

Fam. III. **Aramidae.**—In this group, as in the *Psophiidae* (p. 257), the osteology and pterylography are Crane-like, the digestive organs and style of plumage Rail-like; a link being thus formed between the two Families. The long, hard bill is slender and compressed, with slightly curved tip; the tibia is partly bare, the metatarsus scutellated. The wing has eleven primaries and some dozen secondaries. The long tongue is said to end in horny filaments, the trachea is sometimes convoluted in males, the nostrils are pervious.

Aramus pictus, the Clucking Hen or Limpkin of the Greater Antilles, South Florida, and Central America, is chocolate-brown

with white flecks; the upper parts are glossed with bronzy-purple, the bill is greenish. *A. scolopaceus*, the Carau, Courlan, Lamenting Bird, or Crazy Widow, ranging from Guiana to Argentina, has only the head and neck streaked. Generally solitary or found in family-parties, these birds conceal themselves by day among reeds or damp forest-vegetation; they rise with difficulty after a preliminary run, and take low, brief flights, the legs hanging down and the wings flapping slowly, while the latter are elevated for a descent. They walk quickly and in stately fashion, limping and jerking the tail; at night they roost on trees. The resonant, melancholy wail is varied by a clucking note, or by an angry cry when breeding. The shallows of streams or marshes are diligently searched for molluscs, which the formation of the beak enables the bird easily to open or break, but small reptiles, insects, and worms are also eaten. The flat nest of herbage, placed among reeds, contains from ten to twelve white eggs, as large as those of a Turkey, clouded with pale brown and purple.[1]

Fig. 52.—Trumpeter. *Psophia crepitans.* × ⅛.

Fam. IV. **Psophiidae.**—The so-called Trumpeters form a single genus of six species inhabiting tropical South America, and somewhat resemble long-necked and long-legged Fowls, the beak being gallinaceous and the tibia partly bare. The long metatarsi are scutellated in front; the wings and tail are short, the ten primaries,

[1] For the habits, *cf.* Sclater and Hudson, *Argentine Ornithology*, ii. 1889, pp. 159-161; Gosse, *Birds of Jamaica*, pp. 355-363; Gundlach, *J. f. O.*, 1875, pp. 353-355.

just equalling the twelve secondaries. The nostrils are pervious. The downy nestlings are chestnut streaked with grey.

Psophia crepitans, the Agami, ranging from British Guiana to Amazonia, is a black bird with velvety plumage on the head and neck, and lax feathering below; a golden-green and violet sheen adorns the lower fore-neck, a rusty brown patch crosses the back and wing-coverts, the bare orbits are pinkish, the beak is greenish or greyish, and the legs are variously stated to be bright green or flesh-coloured. *P. napensis* of Ecuador has the sheen on the neck dull purple, *P. leucoptera* of Peru and Upper Amazonia lacks the brown above, and has the inner wing-coverts and inner secondaries white, these feathers being ochraceous in *P. ochroptera* of the right bank of the Rio Negro. *P. viridis* of Amazonia—from Pará up the right bank of the Rio Madeira to the Rio Mamoré—probably not identical with *P. obscura*, has the back and inner secondaries glossed with green. The sexes are similar.

These birds love moist forests, and sometimes form flocks of three hundred individuals; they are so sociable and easily tamed that the natives use them to protect poultry. They perch, but seldom fly, and run swiftly with a peculiar gait, while they swim on an emergency. The deep-toned ventriloquistic, but not strictly trumpeting, cry is uttered with widely opened beak; the food consists of fruit, corn, and insects. The nest, said to be at the foot of a tree, contains creamy- or greyish-white eggs, like those of a Bantam.

Fam. V. **Cariamidae.**—These birds have given rise to much discussion, and have been placed by several authors in the Accipitres, near the Secretary-Bird, which they somewhat resemble in their erect carriage, general appearance, and habits. The beak is short, broad, and slightly hooked, the neck is rather long, the legs decidedly so; the tibia is partially bare, the metatarsus is entirely scutellated, the claws are sharp and curved. The wings are short, with fourteen elongated secondaries and ten primaries; the long, graduated tail has twelve rectrices. The nostrils are pervious. The internal anatomy and pterylosis are Gruine, an aftershaft is present, and the downy young are either grey and brown (*Cariama*) or rufous and black (*Chunga*). *Cariama cristata*, the Seriemá, or Crested Screamer (p. 110), extending from Pernambuco to Paraguay and Matto Grosso, is ochreous-grey above with zigzag umber markings, and whitish below with brown stripes. Vertical feathers on the lores form a conspicuous crest, while those of the neck and throat

are long and loose; interrupted white bands cross the remiges, and the bases and tips of the lateral rectrices. The iris is yellow, the beak and feet are red, the naked orbits greenish. The female is yellower, and exhibits less crest. *Chunga burmeisteri*, the Chuñia of Tucuman and Catamarca in Argentina, is smaller and darker,

FIG. 53.—Seriemá. *Cariama cristata*. $\times \frac{1}{7}$.

with shorter legs and little crest; it has a broad white superciliary streak, and two wide black bars on the tail-feathers, except the median pair. The bill and feet are black, the iris is grey.

Both species are chiefly diurnal, the former frequenting the high grass of the open "campos" in pairs and parties of five or six, the latter forests or bushy districts; they roost on trees,

stalk about in stately fashion, stoop when running, and fly a little when hard pressed. The barking or screaming cry is chiefly heard towards dusk; the food consists of small mammals, snakes, lizards, snails, worms, insects and their larvae, as well as berries, *Chunga* preferring the insect diet. Easily domesticated, and in Brazil protected by custom, these birds will guard their owners' fowls; while the male at times incubates and shews off to the females in spring, like a Bustard. *Cariama* builds a nest of twigs in low trees or bushes; *Chunga* generally chooses the ground; but in either case the young soon leave their quarters; the two eggs have a pale ground-colour with rufous blotches, as in so many Rails. The Seriemá has been hatched in the Zoological Society's Gardens in London.

The fossil *Phororhachos* and certain others of the so-called Stereornithes (p. 44) probably belong here.

Fam. VI. **Otididae**.—The Bustards are here admitted as a Family of the Gruiformes, though many writers have preferred to refer them to the Limicolae, and the question is by no means finally settled. The head is flat, the neck thick, the bill somewhat blunt and depressed, being either short, as in *Otis* and *Trachelotis*, or longer, as in *Neotis* and *Lissotis*. The metatarsus varies much, the length for instance being comparatively great in *Houbaropsis*, and small in *Otis tetrax*, while both surfaces are covered with reticulated scales; the short, stout toes have flattish nails, and the hallux is absent, as in many Limicoline forms. The wings are moderate, with the secondaries almost equal to the primaries, the latter—which are acuminate in *Sypheotis*—being eleven in number, and the former about twenty; the tail, of medium length, has a more or less rounded outline, and possesses from fourteen to twenty rectrices. Ornamental plumes are characteristic of this group, and take the form of decided crests on the crown and nape, or on the latter alone, in all the genera except *Otis*, *Neotis*, *Lissotis*, *Trachelotis*, and *Sypheotis*; the last-named, however, has elongated cheek-feathers with bare shafts and spatulate webs. The plumes of the throat and fore-neck are lengthened and shield the breast in *Houbaropsis* and *Eupodotis*, those of the sides of the neck form a ruff in *Houbara*; while *Otis* is remarkable for the prolonged ear-coverts, and for the tuft of long bristly feathers on each side of the base of the mandible in the male.

The nostrils are pervious, the tongue is sagittate, the furcula

is Y-shaped, and often ancylosed with the sternum, the syrinx is tracheo-bronchial. An after-shaft is present, and the down, which is uniform in the young only, is in them mottled with black and lighter tints. A most remarkable phenomenon, moreover, is the gular pouch, opening under the tongue, found in the male of some examples of *Otis tarda* during the breeding season. This pouch becomes very small or vanishes altogether at other times of

FIG. 54.—Great Bustard. *Otis tarda*. $\times \frac{1}{9}$ or $\frac{1}{10}$.

the year, and seems to be restricted to adult birds. Similar, but smaller, processes have been observed in *Eupodotis kori*, *E. edwardsi* and, it is said, *Otis tetrax;* while dilatations of the oesophagus have been recorded in *E. australis* and *Neotis denhami*.

Otis tarda, the Great Bustard, which, as a native, only became extinct in Norfolk about 1838, used to extend from East Lothian to Dorset, but is now merely an occasional visitor to Britain. The upper parts are mottled with rufous, buff, and blackish-

brown, the head is blue-grey, with long white bristles at the base of the mandible, the lower surface is white, relieved in the male by a tawny gorget for a short time during the breeding season. The primaries are black, most of the secondaries and wing-coverts white. Some other Bustards seem to have a similar vernal change of plumage. The female is smaller and has no bristles. *O. tetrax*, the Little Bustard, a straggler to our shores, is somewhat like the last species in colour, but has the cheeks and throat grey, bordered by a white line, and below this comes a broad black collar divided in front by a median white band in the nesting time. The female is brown and black, with white breast and no collar. The remaining members of the Family vary considerably in pattern of colour, being spotted, streaked, or vermiculated above, and being occasionally very dark ; the head and the lower parts, moreover, are not uncommonly quite black, or the latter may be greyish-blue, as in *Trachelotis coerulescens*. The bill and feet are usually yellow, more seldom greyish or dusky. Females and young exhibit a more uniform mixture of brown, black, and buff, while rufous bases to the feathers are characteristic of the group.

Bustards are Old World birds, reaching eastwards to Australia, where *Eupodotis australis* is called the "Native Turkey." *E. edwardsi* inhabits the plains of India, *E. arabs* extends from Arabia to North Africa, and *E. kori* from the East to the South of that continent. *Otis* ranges over South and Central Europe, and thence to North Africa, inhabiting also Mid-Asia to North-West India, the Yangtze-Kiang River and Japan. *Houbara undulata*, the African Ruffed Bustard, reaches from the Canaries,[1] through the Mediterranean basin to about Armenia ; its congener *H. macqueeni*, which strays westward to Britain, being resident in Persia, North India and Central Asia. *Houbaropsis bengalensis* and *Sypheotis aurita* are the Florican and Lesser Florican of India ; *Lophotis*, *Compsotis*, *Heterotetrax*, *Neotis*, *Lissotis*, and *Trachelotis* inhabit the Ethiopian Region. The members of the Family are to some extent migratory, and perhaps the Great Bustard was partly so of old in Britain.

The members of this Family flock in winter, and occasionally form small parties at other seasons, the males being very possibly polygamous, though the fact is hardly proved. Typically inland birds, they haunt dry grassy and sandy plains, or cultivated ground

[1] Mr. Rothschild has separated the Canary Island race as *H. fuerteventurae*.

where the crops are low, yet sometimes they choose more bushy flats, or stony tops of elevated ridges. Their flight is prolonged and often rapid, though invariably heavy, the neck and legs being outstretched; the Great Bustard rises from the ground slowly, the Little Bustard with a rattling noise, but they are frequently loth to leave it, crouching to escape detection on the similarly coloured soil. They stalk about rapidly and run with ease, being shy, wary, and far-sighted, while they are more easy to approach when they resort to water. The quill-feathers are said to be lost after breeding.[1] In spring the pugnacious cocks strut around the hens, swell out and partially reverse their plumage, and inflate the gular pouch; the head meanwhile is thrown backwards, the wings droop, the tail is usually erected and outspread, and booming or crooning utterances with leaps diversify the performance. At times the notes are described as scolding, drumming, craking, and clucking, or resemble "cok-cok" or "prut-prut." The diet consists chiefly of juicy plants, such as young corn and turnips, clover and plantains, but it includes berries and seeds, insects and their larvae, molluscs, myriapods, frogs, or even small reptiles and mammals. The Gom-Paauw[2] (*Eupodotis kori*) is so-called from its love of mimosa gum. The eggs, varying from two to four or five in different species, are deposited in an excavation in the soil—sometimes lined with grass—under shelter of a bush, tussock, or growing crop; they are oily-green, olive, drab, red-brown, or exceptionally bluish-green, and are generally blotched, clouded, or zoned with purplish or dull red. The hen sits very closely. Bustards can be circumvented by riding round them in constantly diminishing circles, and they are also captured with Falcons.[3]

A fossil *Otis* is recorded from the Miocene of France and Germany.

Fam. VII. **Rhinochetidae**.—This contains only one species, *Rhinochetus jubatus*, the Kagu of New Caledonia, a very old and generalized form, somewhat bigger than an ordinary fowl, which was originally referred to the Herons and then to the Cranes, but is undoubtedly nearly allied to the latter, and approximates rather closely to *Eurypyga*.[4] The head and eyes are large; the neck is

[1] Chapman and Buck, *Wild Spain*, London, 1893, p. 342.

[2] The Boers of South Africa term all Bustards Paauw, *i.e.* Peacock (*Pavo*).

[3] Dresser, *Birds of Europe*, vii. 1871-81, pp. 388, 394.

[4] W. K. Parker, *Tr. Zool. Soc. London*, vi. p. 501; x. p. 307; Murie, *op. cit.* vii. p. 465; A. D. Bartlett, *P. Z. S.* 1862, p. 218.

strong; the bill is Heron-like, but somewhat flat above, with a wide nasal groove. The sternum is weak and narrow, having no posterior notch; the furcula is U-shaped; the legs are moderately long and slender, the toes Rail-like, with curved claws; the tibia is half bare, the metatarsus scutellated, with smaller scales behind. The wings are moderate, broad, and rounded, though less developed than in *Eurypyga*, the primaries being ten in number, and the secondaries—of which the inner exceed the primaries—thirteen;

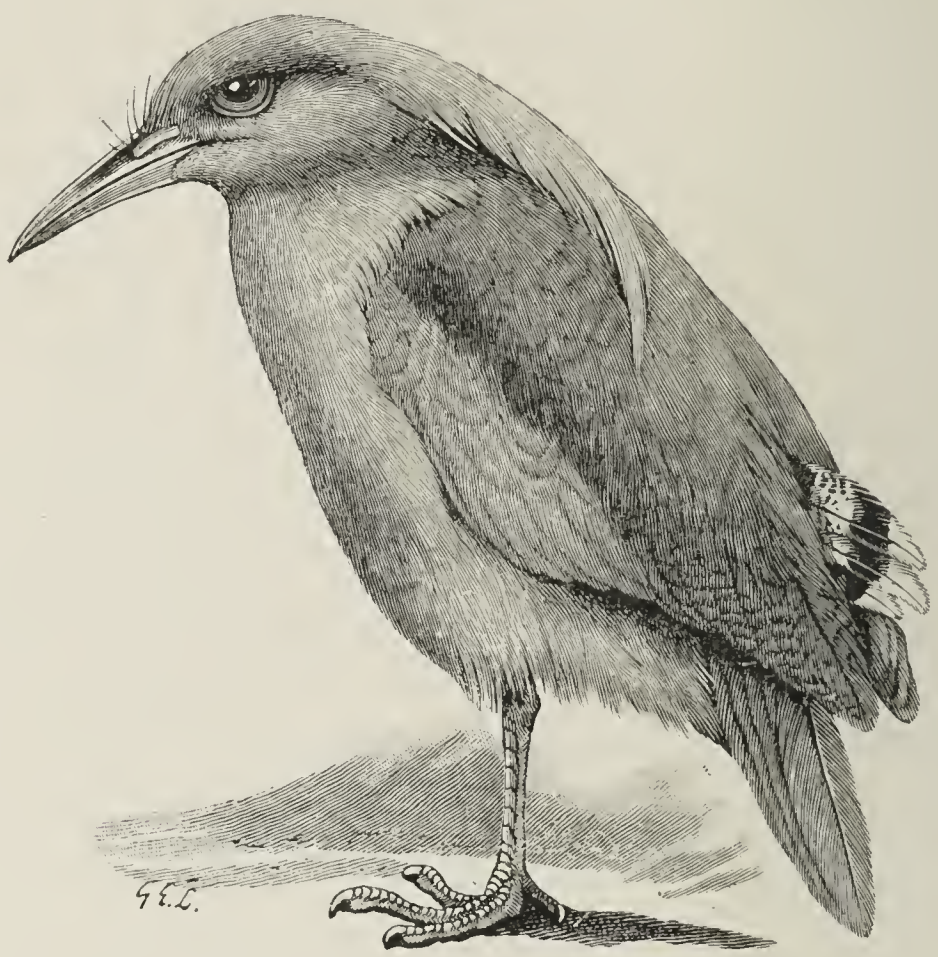

FIG. 55.—Kagu. *Rhinochetus jubatus.* $\times \frac{1}{5}$.

the tail is fairly long and ample, with twelve rectrices. The aftershaft is large; the nostrils are impervious, contrary to the rule in the Order, being severally overhung by a peculiar rolled-up membrane, said to protect them when the beak is thrust into the soil; the tongue is lanceolate. Powder-down patches are profusely distributed over the whole body, except towards the remiges and rectrices. The plumage is slaty-grey, with indistinct dark bars on the wings and tail; but when the former are expanded, rufous and white bands appear, varied by black markings; while a long, erectile whitish-grey crest adorns the occiput and nape. The bill and feet are orange-red. In adults down covers the whole surface. Possibly the chicks remain a con-

siderable time in the nest, but this is by no means certain: those of *Eurypyga* do so, it is true, but those of Cranes and Rails do not. Immature specimens are more rufous, with black bars above.

Though formerly the Kagu was not rare in its native island, it is now restricted to the wilder portions, where it is to be met with among the rocks of craggy ravines or near stagnant waters, sleeping throughout the day and issuing from its concealment towards evening. It walks quickly, yet in a stately manner, often coming to a standstill or crouching, and remaining motionless for a long period; but it can also run rapidly with the head and neck outstretched, and the body carried after the manner of a Rail. The habits in confinement, however, make it somewhat doubtful whether the bird is as nocturnal as is asserted, for in the daytime it is quick and lively in its motions, chasing its fellow-captives, dancing round with the tip of its outspread wing or tail held fast in its bill, tossing about dry leaves or pieces of paper, spreading out its wings and thrusting its beak into the ground, kicking with its legs, and finally tumbling about as if in a fit. The note is guttural and rattling, or almost a scream; the food consists of molluses, worms, and insects, sought for among the grass or in crannies, while the bill is often plunged into the soil, and worms pulled out, shaken and swallowed. When in quest of food the bird often paws the earth with gentle strokes, and snails are usually beaten upon the ground to break the shell. It will bathe in captivity, and is said to like wet weather in its native haunts. The nest is unknown, but eggs laid at the Zoological Society's Gardens in London are reddish-buff with brown and grey markings, and recall those of the Woodcock or Cornerake.[1]

Fam. VIII. **Eurypygidae**.—Two species of *Eurypyga* are comprehended herein, namely, *E. helias* of the countries from Venezuela to Bolivia and Central Brazil, and *E. major* of Central America, Colombia, and Ecuador. These are, like the Kagu, very ancient types, but whereas that bird shows some affinity to *Scopus*, these trend rather towards *Nycticorax*, both being, however, essentially Gruiform. The neck is long and thin, the bill rather slender, with grooves on the maxilla and mandible: the whole leg and foot are as in *Rhinochetus*, but shorter, weaker, and reticulated behind: the wings and tail are even more ample, while the number of primaries and rectrices are the same, but the secondaries are only

[1] Layard, *Ibis* 1882, pp. 534-535; Bartlett, *P.Z.S.* 1862, pp. 218; 1868, pp. 114-116.

eleven, and the inner feathers comparatively short. The nostrils are pervious, the tongue is lanceolate, the furcula is U-shaped, the after-shaft is diminutive, and the powder-down patches are abundant, though writers differ as to their extent. *E. helias*—as Prof. Newton says in his excellent account[1]—is not to be described in a limited space otherwise than generally; it has a black head, with a white stripe above and under each eye, and a white throat: the remaining plumage "being variegated with black, brown, chestnut, bay, buff, grey, and white—so mottled, speckled, and belted either in wave-like or zigzag forms, as somewhat to resemble certain moths. The bay colour forms two conspicuous patches on each wing, and also an antepenultimate bar on the tail,

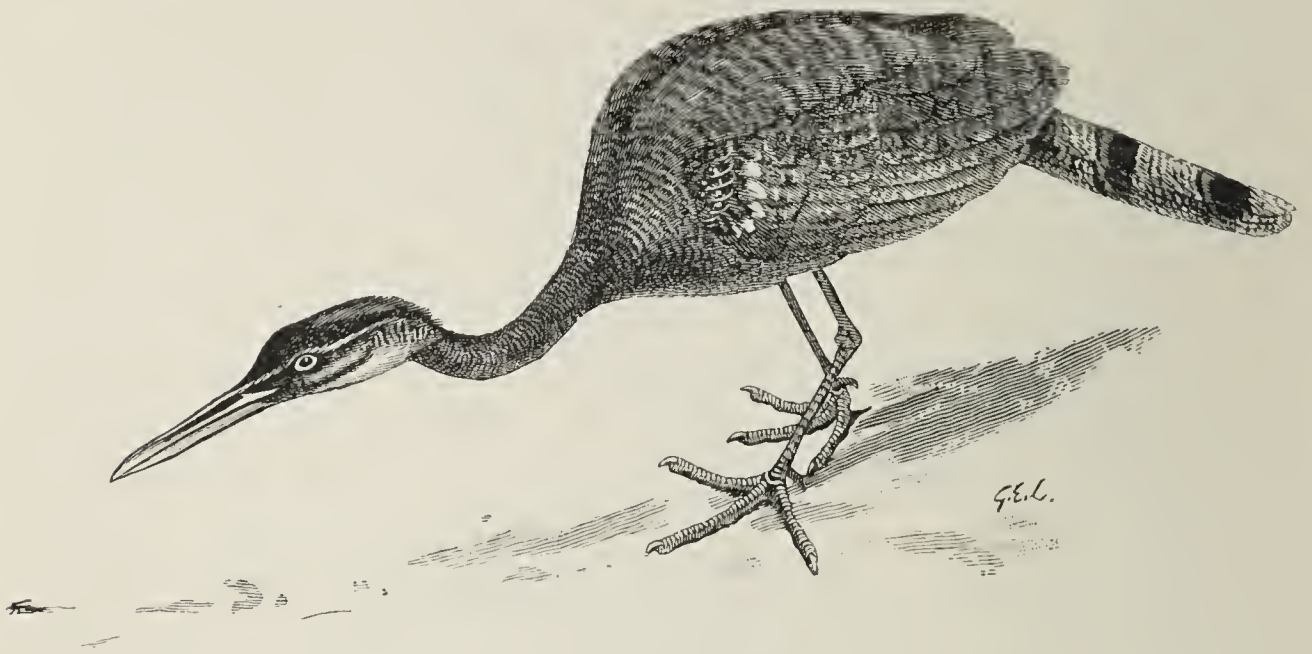

FIG. 56.—Sun-Bittern. *Eurypyga helias*. $\times \frac{1}{4}$.

behind which is a subterminal band of black. The irides are red; the bill is greenish-olive; and the legs are pale yellow." *E. major* is larger and more uniform in colour. Both adults and nestlings have copious down, that of the latter being lightish brown with lines and spots of darker brown and white. The sexes are similar.

The "Sun-Bittern," to use its common but misleading name, is found on the larger rivers, where the banks are wooded and swampy; it is shy but easily tamed, and, according to Bates, is kept in captivity by the Brazilians. It walks quietly and circumspectly with horizontal body and outstretched head, and probably flies but little. Like the Kagu, it executes a fantastic dance, but in this case the wings and tail form a semicircle which nearly conceals the body. The note is a soft or plaintive long-

[1] *Dict. Birds*, 1896, pp. 923-925.

drawn whistle, the food consists mainly of small fish and insects, which the bird spears by darting out its head quickly. The nest, said to be made of sticks, grass, and mud, with a lining of the latter, is placed on low branches, and contains several eggs similar to those of the Kagu, but smaller. Both parents incubate and attend to the young, which have several times been reared in the Zoological Society's Gardens in London.[1]

Fam. IX. **Heliornithidae.**—The Finfoots, comprising three genera and four species, now generally coupled with the Rallidae, have been placed near the Divers and Grebes by several authors. The head is small, the neck thin, the bill Rail-like and fairly stout; the metatarsus, which is scutellated anteriorly and reticulated posteriorly, is short, twisted outwards, and deeply grooved; while the toes have short, sharp claws, and broad scalloped webs, extending in *Heliornis* to most of their length. The long pointed wings have twenty-one remiges, of which eleven are primaries, and are armed with a curved spine; the tail consists in *Podica* of eighteen elongated, stiff, ribbed rectrices, which are narrow and pointed, and in *Heliopais* and *Heliornis* of rather soft, short, rounded feathers. The plumage is close, but not glossy as in Grebes: there is no after-shaft, the U-shaped furcula ancyloses with the sternum, the tongue is lanceolate, and the nostrils are pervious.

These birds, which frequent the swamps or rocky streams of inland woods, are very shy; their flight is heavy, and they rise with difficulty from the surface of the water, aiding themselves by their feet. They swim and dive well, and will remain half-submerged for hours, or will sit upon a low branch over a stream, dropping down and scrambling up the bank when disturbed, or hiding at its base. They are said, moreover, to run swiftly on land. The note of *Heliornis fulica* is like a dog's bark; the food is in all cases of small fish, crustaceans, insects, and seeds. The nest and eggs are unknown, but in the species just mentioned the nestlings are stated to be naked. This form, about thirteen inches long, which ranges from Guatemala to Paraguay, is olive-brown above, the black head and nape being separated by a white band down each side of the neck from a blackish line which encloses the white throat; the chest is buff, the sides are brown, the remaining underparts whitish; the bill is red, the feet are yellow, banded with black. *Podica senegalensis* of West Africa, and the doubtfully dis-

[1] *P.Z.S.* 1866, p. 76.

tinct *P. petersi*, reaching from the Lower Congo to South East Africa, are larger forms, with round ochreous spots above, and red feet. *Heliopais personata*, extending from Assam to Sumatra, has a black throat, orange bill, and light green feet.

Order XI. CHARADRIIFORMES.

The Charadriiformes are here taken to consist of five Sub-Orders. Of these the LIMICOLAE contains the Families *Charadriidae* (Plovers, Sandpipers, Snipes, and so forth), *Chionididae* (Sheath-bills), *Glareolidae* (Pratincoles, Coursers, and Crab-Plover), *Thinocorythidae* (Seed-Snipes), *Oedicnemidae* (Stone-Curlews), and *Parridae* (Jaçanas); the LARI possesses one Family, *Laridae* (Gulls, Terns, and Skuas); the ALCAE only the *Alcidae* (Auks); the PTEROCLES, the *Pteroclidae* (Sand-Grouse); but the COLUMBAE may be divided into *Didididae*, *Didunculidae*, and *Columbidae*. The first three may again be combined into a Laro-Limicoline group, and the last two into a Pteroclo-Columbine, in accordance with their affinities.

In structure the LIMICOLAE are sufficiently uniform to be considered simultaneously.

The bill furnishes a useful means of subdividing the *Charadriidae*. It is hardest in *Haematopus*, *Ibidorhynchus*, *Strepsilas*, and so forth, being in them bony throughout. In *Charadrius*, *Aegialitis*, *Lobivanellus*, *Vanellus*, and the like, it has a hard tip, but is comparatively flexible towards the base. These may compose Sub-family (1) *Charadriinae*. In *Totanus*, and its nearest allies, it is still hard at the tip, but more flexible at the base. In *Tringa*, and similar genera, it ceases to be hard at the tip, and is slightly endowed with nerves. These may constitute Sub-family (2) *Tringinae*. In *Scolopax*, *Gallinago*, and *Rhynchaea* it becomes highly nervous at the tip, and therein differs from that of all other birds. These form Sub-family (3) *Scolopacinae*. In *Himantopus* and *Recurvirostra* the bill is so attenuated as hardly to be called hard at the tip, but it has no nerves there. The form of the beak varies greatly, being asymmetrical and twisted to the right in *Anarhynchus*, up-curved from the middle in *Avocetta*, wedge-like in *Haematopus*, much flattened in *Tringa platyrhyncha*, spade-shaped in *Eurynorhynchus*, arched in *Numenius*, and strongly decurved in *Ibidorhynchus*. In the Chionididae a horny sheath covers the base of the maxilla, and is indicated by faint lines in the young; in *Glareola* the bill is short, curved, and very

deeply split, making a wide gape; in *Dromas* it is hard, deep, and compressed: in *Cursorius* thick and little bent; in the Thinocorythidae Fowl-like; in the Oedicnemidae short, stout, and blunt; in the Parridae narrow and pointed, with a skinny frontal plate, and occasionally with rictal wattles. The nasal grooves are very long in *Ibidorhynchus, Totanus, Scolopax* and elsewhere.

The tibia is often partly bare, and the metatarsus is extremely variable; the legs are longer in *Himantopus* than in any other bird of its size, and long also in *Recurvirostra, Cursorius, Dromas*, the Parridae, and so forth, while *Haematopus, Aegialitis, Scolopax, Glareola, Chionis, Tringa*, and the Thinocorythidae are instances of the contrary. Both the front and back of these members are scutellated in most Scolopacinae and Tringinae, but the Charadriinae differ considerably in this respect; in *Glareola* the fore-part only is transversely scutellated, in *Cursorius, Dromas*, the Thinocorythidae and Parridae the whole of the surface, while in the Chionididae and Oedicnemidae both aspects are reticulated. The anterior toes are ordinarily free, or have the third and fourth digits slightly connected; but *Dromas* and *Recurvirostra* have them partly webbed, as to some extent have *Himantopus, Totanus semipalmatus*, and a few other forms, while in *Phalaropus* the metatarsus is much compressed, and the toes have lobed margins. The hallux, normally set rather high, is frequently aborted, as in *Charadrius, Ibidorhynchus, Calidris, Cursorius* and *Oedicnemus;* in the Thinocorythidae and *Glareola* it is very small, in *Dromas* larger; in the Parridae all four digits are on a level and abnormally long, as are the claws, so that the birds walk easily on floating vegetation. The nail of the mid-toe is pectinated in the Glareolidae, recalling that of the Caprimulginae (Night-jars). The digits are often somewhat fleshy, *Oedicnemus* moreover, has an enlarged tibio-tarsal joint.

The wings are usually long, having a bilobed appearance owing to the equality of the inner secondaries and outer primaries: *Himantopus, Dromas, Glareola*, and the Thinocorythidae have them much elongated, *Phegornis* and some other forms very short, while in *Vanellus* the expanse is most noticeable. In this genus, *Lobivanellus, Hoplopterus*, the Chionididae, and the Parridae, is found a carpal spur, often large and sharp; *Metopidius*, and, apparently, *Hydralector* have the radius dilated into a sub-triangular lamina [1];

[1] W. A. Forbes, *P.Z.S.* 1881, pp. 646, 647.

Hydrophasianus has peculiar filamentous appendages to the first and fourth primaries; *Scolopax minor* has the three exterior of the normal eleven primaries particularly attenuated. The secondaries in the Limicolae vary from ten to twenty.

The rectrices are usually twelve; though *Rhynchaca* and the Parridae have ten, while *Scolopax stenura* and *S. mcgala* possess twenty and twenty-six respectively, the outer of which are exceedingly stiff and narrow—not to give further instances. The tail in *Glareola* is deeply furcate and Swallow-like, in *Hydrophasianus* it has the four median plumes very long and decurved in the breeding season; but it is often quite short, as in *Scolopax*. The form may be slightly forked, as in *Chionis;* somewhat graduated or cuneate, as in the Thinocorythidae, *Totanus hypoleucus*, and *Ocdicnemus;* rounded, as in *Cursorius;* or almost even, as in *Vanellus*.

The tongue is rather long and pointed, being, however, rudimentary in *Numenius;* the nostrils are pervious, except in the Thinocorythidae, Glareolidae, and perhaps *Dromas*, and have at times a leathery operculum in Plovers; the syrinx in tracheo-bronchial, the furcula U-shaped; *Parra* has a decidedly muscular gizzard, and the Thinocorythidae possess a globular crop. The convoluted trachea of *Rhynchaca*, the papillae on the orbits of *Chionis*, the caruncles on the face of *Machetes*, and the loral wattles of *Lobivanellus* are fully described below. The aftershaft is very small in the Parridae, rather large elsewhere. In adults the down is sparing; in the young it is short, thick, and commonly of a yellowish hue, with brown longitudinal stripes; though it may be grey, as in *Chionis* and *Hacmatopus;* mottled with reddish and white, as in Snipes; or with black, orange, yellow, and white, as in Phalaropes.

The plumage is usually plain brown or grey, with an admixture of white, or less commonly chestnut; *Vanellus, Lobivanellus*, and *Cursorius chalcopterus*, however, exhibit metallic hues, and *Chionis* is white. Red or yellow beaks or feet adorn many forms. Crests occur in certain species of *Vanellus, Hoplopterus*, and *Lobivanellus;* the male of *Machetes* (Ruff) is most remarkable for its lateral head-tufts and fine neck-frill, developed for the breeding season; *Numenius tahitiensis* has peculiar bristly-pointed flank-feathers. In *Scolopax* the large eyes are set unusually far back in the skull. The sexes are generally similar, but in *Eudromias*,[1] *Phalaropus*, and *Rhynchaca* the female is brighter than

[1] See, however, Sharpe, *Cat. Birds Brit. Mus.* xxiv. 1896, p. 741.

the male, as well as larger, the latter fact holding true of a considerable number of the Tringinae and Scolopacinae, and of the Parridae, though a special study of the subject is still needful. In several species the breeding plumage differs remarkably from that of winter.

The *Limicolae* often flock together in the cold season, but are by no means uniform in their habits, and divergencies will be noticed under the various genera. They run well, often bobbing the head up and down, and fly strongly, wheeling round sharply in the air: while some Snipes rise in zigzag fashion. Typically waders, many, if not all of them, can swim on emergency, but few habitually do so, like Phalaropes. Exceptionally they perch on trees, or soar. Swamps, river-sides, and in winter the sea-coast, are the general haunts; but Coursers, Stone-Curlews and "Seed-Snipes" frequent arid or stony localities, *Dromas* sandy islets or shores, *Chionis* maritime rocks. *Vanellus cayennensis* and *Parra jacana* are said to indulge in dances, while Lapwings and other species feign to be wounded if their young are in danger. The food consists of crustaceans, molluscs, worms, and insects; rarely of small fish or eggs of other birds; but not uncommonly of vegetable matter, on which the Thinocorythidae entirely subsist. The usual note is shrill, but the "scape, scape" of the Snipe, the melancholy whistle of the Curlew, the yelp of the Godwit, the reiterated scream of the Oyster-catcher, and the sweet song or trill of Temminck's Stint and of the Green Sandpiper should be noticed among the exceptions. Usually four pyriform eggs, varying from brownish or olive-green to stone-colour, with double markings of lighter and darker shades, are arranged in a hole scraped in the ground, with or without lining, the small ends pointing to the centre. Those of Oyster-catchers and Stone-Curlews are more oval, while the Dotterel and some other species lay only three, and Stone-Curlews two. The Parridae amass a considerable pile of water-plants, *Chionis* usually breeds in holes among rocks, the Green and the Wood-Sandpiper often use deserted nests of other birds. The young run almost from the shell, the Stone-Curlews and *Dromas*, which lays a white egg in sandy burrows, being to some extent exceptions. The male performs most of the duties of incubation in *Rhynchaea*, *Phalaropus*, and apparently the Dotterel, Bar-tailed Godwit, and Purple Sandpiper—if not elsewhere; while the Ruff is well known to be polygamous. Stone-Curlews and Wood-

cocks are certainly somewhat crepuscular, and the drumming of the Snipe (p. 291) must be mentioned in passing. Nearly all Limicoline birds are migrants, and may frequently be heard overhead at night, when on passage. The flesh is generally excellent.

Fam. I. **Charadriidae**.—Sub-fam. 1. *Charadriinae*.—The Dotterel (*Eudromias morinellus*), breeds on the fells and tundras of Northern Europe and Asia, as well as on the mountains of Scotland, Transylvania, Styria, and Bohemia—if not still in the English Lake District; in winter it migrates to Palestine and North Africa. The colour is ashy-brown, with black crown and nape, towards the latter of which the white superciliary streaks run down; the throat is whitish, the fore-neck brown, divided by a white gorget from the orange-chestnut lower breast; the abdomen is black, the lateral rectrices are tipped with white. The young are more rufous above, and grey and white below. Three olive eggs with brown blotches are laid in a depression of the mossy ground, the parents being tamer than most Plovers at the nest. *E. veredus* inhabits Mongolia, wintering in the Sunda Islands, the Moluccas, and Australia; *E. australis* is confined to the last country; *E.* (*Zonibyx*) *modestus*, the only four-toed species of the genus, ranges from Tarapacá and Buenos Aires to Tierra del Fuego and the Falkland Islands. *Charadrius pluvialis*, the Golden Plover, breeds on the higher British moorlands, and reaches from Northern Europe to the Lena in Asia, overlapping about the Yenisei *C. fulvus*, with grey instead of white axillaries, which extends to Bering Sea and—as the stouter, shorter-toed race *C. dominicus*—to Greenland. Both the latter have occurred in England. The plumage is black, densely spotted with yellow above, the forehead and superciliary streaks are white, as are the sides of the body. In winter the under parts are nearly white. At that season the various species migrate southwards as far as Cape Colony, India, Australia, New Zealand, Polynesia, and Chili. The loud clear whistle of the Golden Plover is a characteristic sound in summer on our sub-alpine hills, where the bird deposits four rich olive-brown eggs in a hollow in the herbage; it is very wary at the nest. The Grey Plover, *Squatarola helvetica*, with a distinct hind toe and black axillaries, is browner than the foregoing three-toed species in summer, and greyer in winter; it visits us from autumn to spring, but breeds in the far north of Eastern Europe, Asia, and America, reaching Cape Colony, Ceylon, and Tasmania on migration. *Erythrogonys cinctus* of Australia, and

the long-billed *Oreophilus ruficollis* of South America from Peru and Argentina to Patagonia and the Falklands, are nearly allied forms; while the rufous New Zealand *Charadrius* (?) *obscurus* apparently somewhat resembles the Dotterel in its habits and eggs.

Aegialitis hiaticola, the Ringed Plover, Sand-Lark, or Stone-runner, mistakenly called the "Ring Dotterel," which is common on the British coasts and even inland, extends from Smith's Sound eastwards to Bering Strait, and migrates to South Africa, North India, or accidentally, Australia. It breeds as far south as the Atlantic Islands, North Africa, and Turkestan. The plumage is light brown, with white forehead, post-ocular streak, upper neck, alar bar, outer rectrices, and under surface; the crown, lores, cheeks, and a collar—broader in front—being black. The young lack the black crown. The habits and "peeping" cry hardly require description. When nesting on the warrens of the Eastern Counties it is called the Stone-hatch, because it there lays its black-spotted drab eggs in a hole paved with small stones. *Ae. curonica*, the Little Ringed Plover, which strays to Britain, the Färoes, and Iceland, breeds on inland waters from Scandinavia to Japan; reaching southwards to North Africa, Turkestan, and China, and on migration to the Gaboon, Mozambique, Ceylon, and New Guinea. It is distinguished from the last species by the shafts of all the primaries, except the outer one, being dusky. *Ae. cantiana*, the Kentish Plover, which still nests in Kent and Sussex, occupies Europe—though very locally—North Africa, and Central Asia to China and Japan; it comparatively seldom breeds inland, and is found in winter as far as South Africa, India, and Australia. The collar is incomplete in front, the female has no black crown, while the black legs distinguish it from

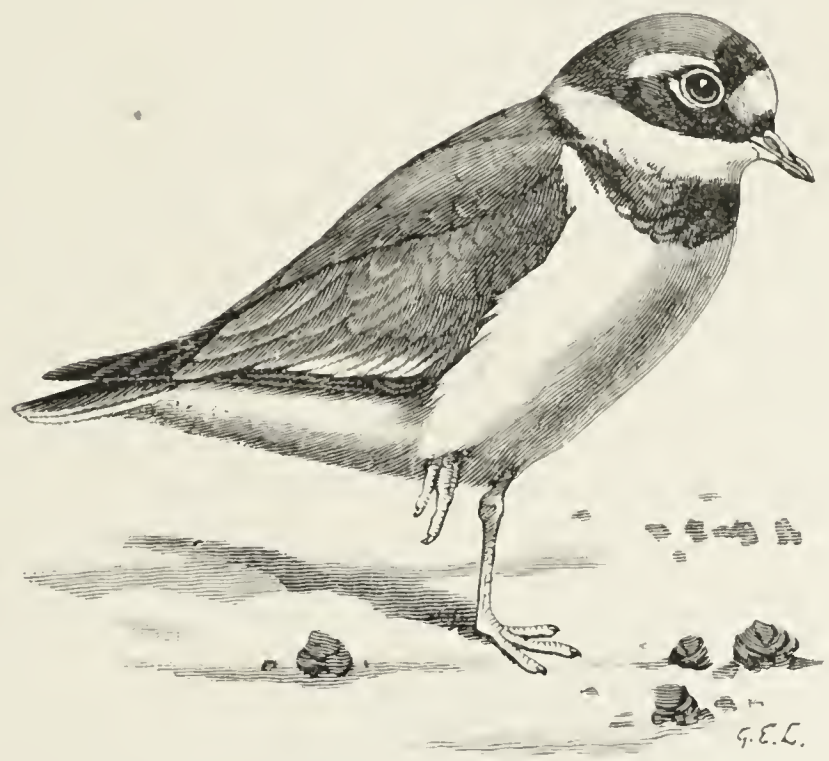

FIG. 57.—Ringed Plover. *Aegialitis hiaticola*. × ⅔.

the Ringed Plover. *Ae. semipalmata,* with a distinct web between the outer and middle toes, replaces the latter in North America, ranging in winter to Peru and Brazil; whereas *Ae. placida* represents it in China, Japan, and India. The place of the Kentish Plover is taken in western North America by *Ae. nivosa*—with white lores instead of black—which migrates to Chili. *Ae. vocifera,* termed "Kill-deer" from its cry, inhabits North America, and extends in winter to northern South America, while it has been shot even in the Scilly Islands; the lores are brown, and the fore-neck exhibits two black bands. It nests in the interior on grass or ploughed fields. In *Ae. monachus* of Southern Australia, the breeding male has a perfectly black head; in *Ac. asiatica* of Central Asia, which has wandered to Britain, the head is brown, and the breast shews a black-edged chestnut band, somewhat similar to that in *Ae. bicincta* of the Australian Region, and other species; *Ae. bifrontata* of Madagascar has grey lores, and two black bands on the breast. Space fails to mention all the species of this large three-toed genus; but *Ae.* (*Thinornis*) *novae zealandiae* of the New Zealand area, *Ae. falklandica* of America from Chili and Argentina southwards, and *Ac. sanctae helenae,* the "Wire-bird" peculiar to St. Helena, should be noticed.

Anarhynchus frontalis, the Wry-bill of New Zealand, is grey, with a black gorget and whitish lower parts; the habits are as in *Aegialitis,* but the laterally-twisted bill enables the bird to pick up insects from around stones with the greatest ease.

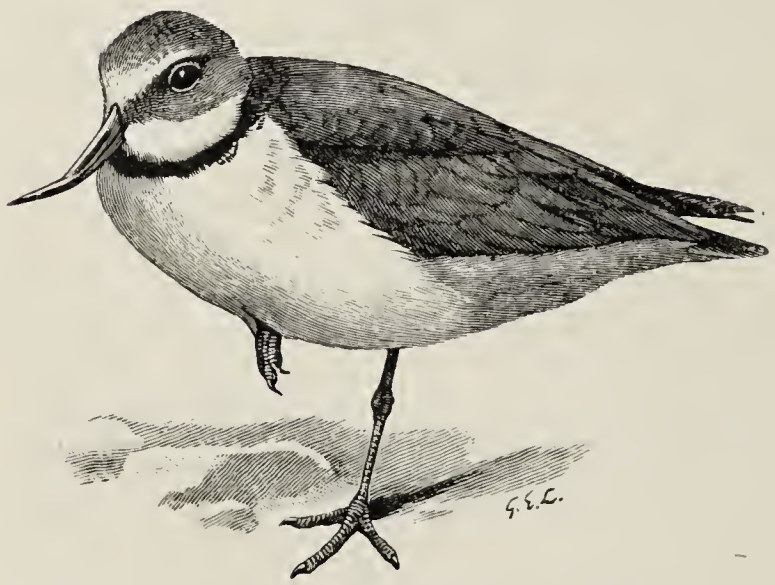

FIG. 58.—Wry-bill. *Anarhynchus frontalis.* $\times \frac{2}{3}$.

Thirteen species may perhaps be included in *Lobivanellus* (Wattled Lapwing); but here, as in the next genus, *Vanellus,* there are many diversities of opinion. The two groups are fairly similar in habits, nests, and eggs. Some have a hallux, some not. *L. pectoralis* of Australia and Tasmania, *L. indicus,* ranging from Arabia and Mesopotamia to Cochin China, *L. cinereus* of China and Japan, which migrates as far as Bengal, *L. melano-*

cephalus of North-East Africa, *L. superciliosus*, extending from West Africa to Lake Tanganyika, and the crested *L.* (*Sarciophorus*) *tectus*, found from Senegal to East Equatorial Africa and Arabia, have small loral wattles; *L.* (*Lobipluvia*) *malabaricus* of India, Ceylon, and Burma, *L. miles*, reaching from Timor Laut to New Guinea and Australia, *L. cucullatus* of Sumatra, Java, and Timor, *L. lobatus* of Australia, accidental in New Zealand, *L. lateralis* of the southern, and *L. senegalensis* of the northern Ethiopian Region, with *L. albiceps* of West Africa and the Upper Congo, have large wattles, and, except the first, a wing-spur. *L. lobatus* is olive-brown above, with black crown, nape, and wings; the cheeks, tail-coverts, and lower parts are white; the tail is white with black tip; the bill, wattles, and spurs are yellow, the feet purplish-red.

Vanellus comprises the true Lapwings; it is a closely allied genus to the last, and varies as to the possession of a hind-toe. *V. cristatus*, the English Peewit or Green Plover, has the upper parts and motile crest bottle-green, with a purple and copper gloss; the throat and upper breast black; the cheeks, sides of the neck, base of tail, and under surface white; the upper and lower tail-coverts bay. The slow flapping flight and shrill cry are as familiar to us as are the cock's aerial evolutions, and the habit of tumbling on the ground with an apparently broken wing to decoy intruders from the brood. This species frequents alike cultivated ground, marshes, and wastes, depositing its four olive eggs with black markings in a scraping in the soil lined with a little dry herbage; towards autumn it feeds in large flocks upon the shore, being semi-crepuscular, as might be expected from the large eyes. Breeding in most of Europe, Northern Asia, and even North Africa, it strays to Greenland and Jan Mayen, occurs plentifully in Japan, and at times in Alaska, and migrates as far south as Barbados, North India, and China. The somewhat similar Téru-téru (*V. cayennensis*),[1] with long crest and large blunt yellow spur, occupies the east, and the larger *V. chilensis* the west and south of South America; *V. resplendens* inhabits the Andes of North Chili, Peru, and Ecuador; *V. coronatus* South and East Africa; *V. melanopterus*, the latter and Arabia; *V. inornatus* West and South-East Africa. The long legged *Chettusia gregaria*, which, like the next genus, possesses a hallux, has occurred in Britain and South-West Europe, but breeds from South-East Europe to Lake Saisan, and migrates to North-East

[1] For this bird's "dances," see Hudson, *Argentine Ornithology*, ii. p. 167.

Africa, India, and Ceylon. *C. leucura*, of similar range, winters in North-East Africa and North India. *Defilippia crassirostris* of North-East, and *D. leucoptera* of South-East Africa, with very long toes and much white on the wing, are nearly akin to the above. *Hoplopterus spinosus*, the three-toed Spur-winged Lapwing of Egypt and the northern Ethiopian Region, which wanders to South-East Europe and Persia, is a crested black and white species with a brownish back. The Arabs call it "Zic-zac" from its cry, while it attacks birds on the wing with its spur. *H. speciosus* occupies South Africa, *H. cayanus* most of South America, *H. ventralis* ranges from North and Central India to Hainan.

Strepsilas interpres, the Turnstone, has the head, rump, tail, and remiges black and white, the upper parts varied with chestnut and black, the breast black, the belly white, and the feet orange, with the hind toe turned inwards. In winter the coloration is chiefly grey and white. From its extensive migrations, it is possibly the most cosmopolitan of Birds, while it breeds in Northern Europe, Asia, and America, and as near us as Denmark, though not proved to do so in Britain. In autumn and spring this lively little species frequents our muddy shores or seaweed-covered rocks, often turning over the pebbles in search of food; the note is a twitter or whistle; the nest a slightly-lined excavation under shelter of some maritime shrub or stone, containing four grey-green eggs, marked with olive-brown. *S. melanocephalus*, of the Pacific coast of North America, lacks chestnut tints. *Aphriza virgata*, the Surf-bird, a brownish species with white alar bar, rump, and abdomen, found from Alaska to Chili, may perhaps be placed here. The position of the scarce Patagonian *Pluvianellus sociabilis*, which is chiefly grey above and white below, is equally doubtful. Both species lack the hallux. *Hæmatopus ostralegus*, the Oyster-catcher, inhabits Europe and Central Asia, extending —as the form *H. osculans*—to China and Japan; in winter it reaches Senegambia, Mozambique, Ceylon, and South China. From the black head, neck, and mantle, white lower back, underparts, wing-bar, and base of tail, it is called the Sea-Pie; while a habit of opening mussels with the long wedge-shaped bill gives it the name of Mussel-picker. Oyster-catcher seems a misnomer, but worms, crustaceans, and so forth vary the diet. It frequents shores and inland rivers, depositing three, or rarely four, oval drab eggs, with blackish and grey markings, on sand, shingle, or rocks.

The scream in the breeding season is often quite deafening, but at other times these wary birds are seldom noisy. Their flight is powerful, and they can swim and dive. The bill is orange and the feet flesh-coloured in this species, as well as in *H. longirostris* of the Moluccas, Papuasia, Australia, and New Zealand, with longer bill and entirely black primaries. *H. leucopus* of Chili, Patagonia, and the Falklands, has a black lower back and pale feet; *H. palliatus* (with its races *frazari*, *galapagensis*, and *durnfordi*), ranging from Nova Scotia and California to Patagonia, has a brown mantle. Of the perfectly black or brownish-black species, *H. niger*, of both coasts of the North Pacific, has pale flesh-coloured feet; *H. moquini*, of the Ethiopian Region, the Canaries, and Madeira, has them deep red; *H. ater*, found from Peru to Patagonia and the Falklands, has the scarlet bill compressed and upturned; *H. unicolor* of Australia and New Zealand has the feet brick-red. This genus has three toes, as has the remarkable *Ibidorhynchus struthersi*, with long decurved red bill and greenish-grey feet, found from Turkestan to China, and in the Himalayas. The front of the head is black, margined laterally with white; the upper parts and neck are grey, with white on the wings and outer rectrices, and black undulations on the tail, which has the tip and coverts mostly black; the under parts are white with a black gorget. The bill is black in the young. The note is whistling, the habits are like those of an Oyster-catcher, while islands in stony or sandy rivers furnish breeding sites.[1]

Himantopus contains the extraordinarily long-legged Stilts, of which *H. candidus* visits Britain and Northern Europe, but breeds only in the southern parts, including Hungary. It also nests in India and Ceylon, and in Africa—though chiefly in the north. In the cold season it reaches Timor, New Zealand, and elsewhere. The head, long neck, lower back, and under surface are white, the remaining parts greenish-black; the iris is carmine, the legs are pink. Females are browner above, while immature males have the crown and nape black or brownish. The note is clear and reiterated, the habits are Plover-like, but the nest, placed on mud or in grass-tufts, is more substantial than in those birds, and contains four olive eggs with black scrawls or blotches. Whether searching the shallows for insects or other food, hovering overhead with dangling feet, or flying with them outstretched, the appearance is equally remarkable. *H. mexicanus* of temperate

[1] See W. W. Cordeaux, *Ibis*, 1894, p. 374; 1897, pp. 563-564.

North America, migrating to Peru and Brazil, has a black occiput and nape; *H. knudseni* of the Sandwich Islands has the sides of the neck also black; *H. brasiliensis* of southern South America has the nape only black, with a white collar below; *H. leucocephalus* of Australia and New Zealand, which visits the Malay Islands, the Philippines, the Moluccas and Papuasia, is similar, but the black does not reach the eye; *H. melas* of New Zealand is uniform black. *H.* (*Cladorhynchus*) *pectoralis* of Southern Australia has webbed feet like the four-toed Avocets, though itself three-toed like other Stilts, from which a bay pectoral band distinguishes it. Of the Avocets with their curious up-curved beak, *Recurvirostra andina*, of the Chilian Andes, alone resembles the Stilts in possessing a black mantle. *R. avocetta*, which bred in England until at least 1824, now ranges from Denmark and Holland to Mongolia and South Africa, though decidedly local; in Asia it migrates southwards to Ceylon and Hainan. The plumage is white, with the crown, nape, inner scapulars, and part of the wings black, the legs light blue. It is called Cobbler's Awl, from its long, flexible bill, or Yelper, from its loud clear cry. Its general habits and slight nest recall those of Plovers, though the eggs are larger; while it seeks for aquatic creatures, in shallows or pools left by the tide, with a curious scooping sidelong action of the beak. *R. americana*, with a pale rufous head and neck, inhabits temperate America, extending in winter to the West Indies and Guatemala: *A. rubricollis* (*novae hollandiae*), with those portions chestnut, ranges from Australia, where it breeds, to New Zealand.

Sub-fam. 2.—The *Tringinae* of the present work—four-toed unless otherwise stated—are often separated into the groups *Phalaropodinae, Totaninae,* and *Tringinae* proper; the first being remarkable for the Coot-like digits with lobed webs. *Phalaropus fulicarius*, the Grey Phalarope, which visits us in winter, and has even reached Chili and New Zealand, breeds in Spitsbergen, Iceland, Greenland, Arctic America, and Asia. It is blackish and chestnut above and rufous below, with a little white on the face, wings, and tail; but the plumage differs remarkably in winter, the upper parts becoming grey with a black nuchal patch, and the lower white. As in all the genus, the female is said to court the male, which is duller, and performs most of the duties of incubation. The eggs are larger and rounder than in the next species, the nest less concealed. *P.* (*Lobipes*) *hyperboreus*, the Red-necked Phalarope,

with more tapering bill, breeds in Scandinavia, Russia, and Siberia, as well as from Alaska to Greenland, Iceland, Shetland, Orkney, and the Hebrides; it rarely migrates to Western Europe, but reaches India, New Guinea, Guatemala, and Peru. It has dark grey and rufous upper parts, a white alar bar, throat, and belly, a grey breast, and chestnut sides of the neck nearly meeting in front. By winter the red tints have vanished and the white has increased. This attractive little bird is often so tame that it will feed at the feet of an intruder, or will even proceed to settle itself on its small and rather deep nest, placed in some tuft of herbage; the four eggs are greenish-olive with black markings. When disturbed from them it flies around with a shrill reiterated "tweet." It breeds in swamps or by hill-lakes, and can swim well, but is not found so far out to sea as the Grey Phalarope. *P.* (*Steganopus*) *wilsoni*, of temperate North America, migrating as far as Patagonia and the Falklands, is a larger, longer-billed bird, with a white nape and a black stripe down each side of the head and neck.

Tringa alpina, the Dunlin or Oxbird, is familiar to most autumn visitors to our flatter coasts. Breeding not uncommonly in Britain, though chiefly in the north, it is found in the colder parts of both the Old and the New World, while exceptionally its eggs have been obtained in Southern Spain; in winter it extends to the Canaries, Zanzibar, India, China, California, and the West Indies. When first they arrive on the shore the large flocks are remarkably tame, and allow even gunners to walk among them, as they forage with head bent down over the mud or sand, or rise with a cheeping cry, only to alight again at close quarters. The slight nest, placed amongst heather or short grass on some moory hill-pasture or seaside marsh, contains four greenish-white eggs with brown or rufous spotting. The plumage exhibits a mixture of rufous, grey, and black above, and is chiefly white beneath, with a large, black; pectoral patch; the decurved bill and the feet are black. Most of the rufous and all the black disappear in winter. *T. minuta*, the Little Stint, a miniature Dunlin with no black on the breast, and a short, straight bill, visits Britain regularly on passage, and breeds from the coasts of Northern Norway and Russia to Arctic Asia, a red-throated species or race (*T. ruficollis*) occurring east of the Lena; in winter the birds reach South Africa, the Indian Region, Australia, and Tasmania. *T. minutilla*, the darker American Stint, with olive feet, which occupies the Arctic New

World, has been obtained in England, and migrates at least as far as Ecuador and Brazil; the very similar Eastern Asiatic *T. subminuta* reaches Bering Island, and winters southwards to the Indian Region and Australia. The habits and eggs of the Little Stint resemble those of the Dunlin, but the latter are smaller; the note, too, is more like the twitter of a swallow. *T. temmincki* is greyish-brown above and more buff below, with dark markings throughout, white belly, alar bar and four outer rectrices. In winter the dusky markings vanish, and the birds resemble miniature Common Sandpipers. They frequently visit Britain, and breed in Northern Europe and Asia, chiefly beyond the limits of forest growth; migrating southwards to Senegambia, North-East Africa, India, the Malay countries, and China. Temminck's Stint has a hovering, butterfly-like flight, and habitually perches on posts and the like, uttering a continuous trilling note or song; the four buff or greyish-green eggs with their brown spotting are deposited on a little herbage among sedge or grass. *T. subarquata*, the Curlew-Sandpiper, is grey, black, and rufous, with chestnut under surface and black bars on the white rump, both these parts becoming white in winter; the bill is long and decurved. As far as is yet known, the breeding-quarters lie in the far north of Asia, eggs having recently (1897) been taken near the mouth of the Yenesei: but the bird occurs in Arctic Europe in spring and autumn, and visits our shores irregularly in company with other small waders in autumn, wandering occasionally to Eastern America and Alaska, and migrating to Cape Colony, India, and Tasmania. *T. fuscicollis*, Bonaparte's Sandpiper, with white upper tail-coverts, but dusky rump and short bill, inhabits Arctic America, reaching the whole of South America in winter, and even straying to Britain. It has also occurred in Franz Josef Land in summer. It somewhat resembles the Dunlin in appearance, and the Purple Sandpiper in habits. The closely allied *T. bairdi* of nearly all America, which breeds towards the North, is distinguished by the median tail-coverts being brownish; it has once been observed in South Africa. Another dark-rumped species is *T. maculata*, the Pectoral Sandpiper, blackish-brown and rufous above, and buff with dusky streaks beneath, the belly being white. It has occurred several times in Britain, but inhabits the "Barren Grounds" from Alaska to Hudson's Bay, and migrates as far as Patagonia. Four greenish-buff eggs with brown blotches are deposited in dry grassy spots.

The male is especially remarkable for his habit, apparently unique in the Family, of inflating the oesophagus during his courting performances, until it hangs down like a bag; meanwhile he takes short flights or rises with stiffened wings in the air, uttering a muffled booming note.[1] The Old World form, *T. acuminata*, extends from East Siberia to Alaska, migrating to the Malay Archipelago, New Guinea, Australia, and New Zealand; it differs in its white chin and distinctly streaked flanks. *T. maritima* or *striata*, the Purple Sandpiper, is brownish-grey above, with rufous spotting on the blacker mantle, and some white on the wing; the throat and breast are greyish with dusky streaks, the abdomen is white. In winter, when the upper parts are purplish-black and the breast is unspotted, it occurs from Scandinavia and temperate America to the Mediterranean and the Bermudas, arriving in Britain later than its congeners, and frequenting spray-washed, seaweed-covered rocks in search of small molluscs. It is usually tame, can swim well, and utters a soft low note. The eggs, often of a very green ground-colour, are deposited in mossy or grassy places on hill-tops, from the Färoes northwards, though in the more Arctic regions of Europe and Eastern America the bird breeds at the sea-level. It nests in Franz Josef Land, but is rare in Asia. The Prybilof Island form has been called *T. ptiloenemis*, the Alaskan *T. couesi*. *T. canutus*, the Knot, possibly, but not probably, named after Canute, has in summer a reddish head and neck, black, cinnamon, and white upper parts, chestnut under surface, and white tail-coverts barred with black. The plumage varies greatly according to age and season, but the winter adult is grey above and white with dusky flecks below. While no absolutely identified eggs exist, this species undoubtedly breeds on the North Georgian or Parry Islands, Melville Peninsula, Grinnell Land, Smith's Sound, and Lady Franklin Bay, but apparently not in Arctic Europe, though possibly in Asia. Large flocks migrate to our shores, and some individuals reach Brazil, Damara-Land, the Indian Region, Australia, and New Zealand; they are tame on arrival and used to be netted for the table in England. In Arctic America *Saxifraga oppositifolia* and *Algae* vary the diet of insects and molluscs, but other Sandpipers are known to eat plants.

[1] Adams, *P.Z.S.*, 1859, p. 130; Nelson, *Auk*, 1884, pp. 218-221; *id. N.H. Collect. Alaska*, Washington, 1887, pp. 108-109; Murdoch, *Rep. Polar Exped. Pt. Barrow*, Washington, 1885, p. 111.

The East Siberian *T. crassirostris*, with no chestnut beneath, migrates to Japan, the Indian Region, and Australia.

Ereunetes pusillus, called the Semipalmated Sandpiper from its partly webbed toes, resembles the western form of the Little Stint in coloration; it breeds in the extreme north of America, and has reached Patagonia in winter. *Eurynorhynchus pygmaeus*, the Spoon-billed Sandpiper, on the other hand, is coloured like the eastern red-throated Little Stint, but is especially remarkable for its large, broad, shovel-shaped bill. The breeding grounds are not known, but it has been obtained on both sides of the North Pacific, and on migration in Japan, China, India, and Burma. *Calidris arenaria*, the Sanderling, easily recognisable by the want of a hind-toe, is rufous and black above, and white below, having a chestnut throat spotted with black. It reaches us in August, while some individuals remain throughout the winter, being at that season uniform grey with white under surface. The eggs, which have a peculiar greenish tint, and are like those of the Curlew in miniature, have been taken in Greenland and Arctic America, but, except perhaps in Iceland, never yet in Northern Europe or Asia. Sanderlings are almost as cosmopolitan as Turnstones, and on migration are commonly observed running at the edge of the surf, uttering a weak, shrill cry. *Limicola platyrhyncha*, the Broad-billed Sandpiper, has a wide flat beak with the pointed tip slightly decurved; the upper plumage is mottled with dark brown, rufous, and white; the breast is reddish-white, spotted with brown; the abdomen white. It occasionally visits Britain, and breeds on the fells of Norway, the fens of Lapland, and thence eastwards to Russia, but is rarely met with in Asia until the Sea of Okhotsk is reached; in winter, when it becomes grey above and white below, it resorts to North Africa, Madagascar, Ceylon, the Philippines, the Moluccas, and China. It soars like a Snipe, utters a rapid, double note, and is somewhat skulking. The parent sits very closely on the eggs, in which the greenish or buff ground-colour is commonly nearly hidden by chocolate or rufous markings. *Tryngites rufescens*, the Buff-breasted Sandpiper, which has wandered to Britain and Heligoland, breeds in the extreme north of America, and just reaches East Siberia; in winter it ranges to Peru and Argentina. Light brown and black above, and reddish-buff with a few black spots below, the distinctive black marblings beneath the quills are well seen as the bird, according to its habit, runs along with one wing raised.

Here may be mentioned *Acchmorhynchus cancellatus* (*parvirostris*), of Christmas and Paumotu Islands in the Pacific, which is rufous-brown with white under surface mostly barred with brown; and *Prosobonia leucoptera*, Latham's White-winged Sandpiper, from Tahiti and Eimeo, with brown head and mantle, chestnut rump and lower parts, white wing-patch and superciliary streak—species of doubtful affinity, which are both presumably extinct.

The large genus *Totanus* is more inland in its haunts during the breeding season than *Tringa*. *T. calidris*, the Redshank, is resident in Britain, and ranges through Europe, the Mediterranean, and Asia south of lat. 60° N., migrating to South Africa, the Indian Region, and Japan. The upper parts are light brown with darker bars and streaks, the primaries being black; the rump, secondaries, tail, and lower surface are white, but the two latter are barred with blackish and flecked with brown respectively; the feet are orange-red, or yellowish in the young. In winter the colour is ashy-grey, with nearly white under parts. This bird breeds in salt marshes or swamps, not uncommonly far inland, and deposits four buff eggs with reddish or purplish-brown spots in grass or rush-tufts, making little or no nest, but drawing the herbage together over the spot to conceal it. Both parents usually rise a long way ahead of the intruder, and fly wildly round, uttering their shrill whistling cry of "pitotoi." Redshanks are especially wary on the coast in winter, and, like Curlews or Lapwings, are the bane of the shooter; they can swim and dive, and not uncommonly perch on trees; the food, procured on sandy spots or sea-weed-covered rocks, consists of molluscs, crustaceans, worms, and aquatic insects. *T. fuscus*, the Dusky or Spotted Redshank, a scarce visitor to our shores, breeds in Europe and Asia, chiefly north of the Arctic Circle, and has a similar winter range to its congener. It generally nests in forest-clearings some way from water, and lays fine greenish eggs, blotched with varied browns. The female sits very closely. Less noisy than its kindred, unless accompanied by young, it flies comparatively strongly, perches on trees, and recalls the Greenshank by its habits. The plumage is black, with white spots above, white rump and barred tail; in winter it resembles that of the Redshank, and the crimson legs become orange-red. *T. flavipes*, the Yellowshank, which has wandered to England, inhabits the colder parts of North America, and migrates as far as Patagonia; it is black, grey-brown, and white above, and white with dusky

markings below, the legs being bright yellow. *T. melanoleucus*, of the same districts, is similar, but larger. *T. guttifer* is a rare North Pacific species, recorded in winter from Calcutta and Burma. It is not unlike *T. glottis*, the Greenshank, which ranges over Northern Europe and Asia, and extends in winter to Cape Colony, the Indian Region, and Australia. This bird has wandered to America, and breeds in the hill-districts of Scotland, resembling the Dusky Redshank in its selection of dry nesting sites, habit of perching, and so forth. It is, however, much more noisy, uttering a strident note, or one dimly recalling a Woodpecker, while it lays large, buffish-white eggs with rich brown blotches. It sometimes eats small fish, as does its congener *T. ineanus*. The plumage is grey and black above in summer and grey in winter, with white rump and tail, the latter being barred with dusky; the white breast is spotted with brown in the breeding season; the slightly up-turned beak is blackish; the legs are olive. *T. stagnatilis*, the Marsh Sandpiper, a miniature Greenshank of somewhat similar winter range, occupies South Europe and Central Asia. *T. glareola*, the Wood Sandpiper, is olive-brown above, with small whitish spots and white rump; the white cheeks, fore-neck, and breast are heavily streaked with brown; the tail-feathers and axillaries are also white with black bars and brown flecks respectively, the feet are olive. The nest has once at least been found in Britain, whence the bird ranges over North Europe and Asia; it has apparently bred in Spain and Italy, and migrates to Cape Colony, the Indian Region, and Australia. In this species and the following the note is shrill and often tremulous, while the former occasionally, and the latter habitually, lays its greenish eggs with reddish-brown spots in deserted nests of other birds near inland waters, instead of on the ground. *T. ochropus*, the Green Sandpiper, which is less spotted above, has much wider black tail-bars, and blackish axillaries with white chevrons. It has been suspected of breeding in Britain, and occupies a similar though somewhat more northern range than the last-named, but does not reach Australia. *T. solitarius*, with almost uniform brown median rectrices, inhabits temperate, and migrates to tropical, South America; it has been shot in the littoral marshes of western England. *T.* (*Symphemia*) *semipalmatus*, largest of the genus, the Willet of temperate North America, which extends to Brazil in winter and wanders to Europe, is brownish-grey with black mottlings, the outspread

wing shewing a white patch, and the white under parts brownish streaks. In the cold season all the dark markings vanish. *T.* (*Heteractitis*) *incanus*, having uniform grey upper, and white under surface, closely barred in summer with dusky, is found through the Eastern Pacific Islands, and on the mainland from Alaska to the Galápagos. *T. brevipes*, with white-banded upper tail-coverts, occurs from Kamtschatka and East Siberia to the Malay Islands and Australia. Both breed to the northward.

Machetes pugnax, the Ruff—with its consort the Reeve—was formerly well-known in England from the large numbers netted or snared for the table. Our nesting birds are now reduced to a few pairs, but considerable numbers visit us on passage, while they breed through northern Europe and Asia, and migrate to South Africa, the Indian region, and Japan, wandering rarely to Iceland and Eastern America. The Ruff's nuptial plumage, which varies extraordinarily and individually, may be chiefly black, white, chestnut, buff, grey and white, and so forth, often with metallic hues or concentric barring. A tuft of stiff curled plumes springs from near each ear, the feathers of the face are replaced by yellowish or pinkish tubercles, and an ample distensible ruff overhangs the breast. Males regain the same colours annually, but after breeding become like the females, which are dark brown and buff, and one-third smaller. The polygamous tendencies and habit of "hilling," *i.e.* sparring on some slight eminence for the Reeves, have been frequently described;[1] the note, though seldom heard, is said to resemble ka-ka-kuk; the food includes seeds, insects, and worms; the nest, placed among herbage in the drier parts of a swamp, contains four greenish, snipe-like eggs, with rich brown blotches. The Ruff performs many antics while courting, but leaves all the work of building, incubation, and the care of the young to his mate.

Bartramia longicauda, which accidentally visits Britain, Continental Europe, and even Australia, inhabits North America, and migrates southward to Chili and Argentina. It is light brown above, varied with black, buff, and white, the long wedge-shaped tail and the under surface of the wing are barred, the rufous lower parts spotted, with black. The throat and belly are white. In winter it is a shy bird, crouching, running with jerks of the tail, or taking short flights; it utters a soft whistle, and lays pinkish-

[1] See Yarrell's *Brit. Birds*, 4th ed., iii. 1882-84, pp. 426-434, and elsewhere.

yellow eggs with brown spots in a slight nest on cultivated lands.

Actitis hypoleucus, the Common Sandpiper, breeds in many parts of Britain, and ranges from the Arctic Circle in Europe and Asia to the Atlantic Islands, the Mediterranean, the Himalayas, and Japan; it leaves us before winter, however, and migrates to most of the Ethiopian, Indian, and Australian Regions. The coloration is greenish-brown above, with dusky markings, and some white on the wings and tail; the breast is grey with dark streaks, the belly white. In winter the upper parts are more uniform. Rapid pebbly streams with islands, or flat stretches of sand are the birds' favourite resorts, where their shrill whistle and somewhat Wagtail-like habits make them very conspicuous; they fly, run, perch, or swim with equal ease. The nest, usually partly sheltered by rough vegetation or drifted rubbish, contains four reddish-buff eggs with brown and lilac spotting. *A. macularius*, the Spotted Sandpiper of North America generally, found in winter southwards to Amazonia and Brazil, is smaller, with round black spots beneath in summer; it lacks the nearly white eighth and ninth secondaries of its congener.

Terekia cinerea, with the up-curved beak of a Greenshank, but the habits and eggs of the last genus, breeds from Archangel eastward to the Pacific, leaving these haunts for the Indian Region to winter, when it is also found in South Africa and Australia. It is grey and black above, with white on the secondaries, and black scapulars, and white below streaked with dusky.

Micropalama himantopus, the long-legged Stilt-Sandpiper, inhabits the extreme North-East of America, migrating to Peru and Argentina. It has black, rufous, and greyish-white upper parts, white tail-coverts, and under parts with blackish bars; in winter the back is grey, while the bars nearly disappear beneath. The habits, nest, and eggs are much as in other Sandpipers.

The Godwits (*Limosa*) have long legs and bills, the latter being slightly up-curved. *L. belgica*, the Black-tailed Godwit, nested regularly, up to about 1824, in the eastern counties of England, and, like the Ruff, was netted for eating. It now breeds from Iceland, the Färoes, and Holland to Siberia and Amurland, the smaller eastern form being sometimes denominated *L. melanuroïdes*; the winter range reaches to the Atlantic Islands, Abyssinia, Ceylon, the Malay Islands, Japan, Australia, and Polynesia.

The breeding plumage is reddish-brown and black above, with rufous crown, neck, and breast, marked with dusky ; the rump and terminal portion of the tail are black, the basal portion, tail-coverts, alar bar, and belly white : in winter the upper parts are brownish, the lower grey. The American representative, *L. hudsonica,* occupies the barren grounds of the north, and migrates to Patagonia and the Falkland Islands ; it has black instead of nearly white axillaries. Though rarer in Britain than the succeeding species during the passage in autumn and spring, small flocks of fairly tame Black-tailed Godwits then frequent our muddy shores and sands—especially in the south ; the summer note, or yelp, is louder than the winter cry. Four elongated pear-shaped eggs, of a dull olive shade with brown markings, are deposited in a slightly lined hollow in some grassy marsh. The males of Godwits constantly incubate. *L. lapponica,* the shorter-legged Bar-tailed Godwit, inhabits the countries from Finmark eastward to about the Taimyr Peninsula, where it meets the race *L. uropygialis,* which extends to Alaska. The western form migrates to the Gambia, Somaliland and North India, the eastern through Japan and China to the Malay Archipelago, Australia, New Zealand, and Oceania, rarely occurring in south-western North America. In summer the mantle is rufous-brown and black, the head and under parts are chestnut, with dark markings from the crown to the sides, the rump is white with a few dusky streaks, the tail and axillaries are white barred with brown : in winter the upper surface is chiefly grey, and the lower white. *L. uropygialis* has the rump also barred. The nest of the Bar-tailed Godwit is usually in comparatively dry spots, or even on forest-clearings, the eggs being brighter green and more finely marked than those of the Black-tailed species. *L. fedoa,* the Marbled Godwit of northern North America, which winters southwards to Central America and the West Indies, is distinguished by its large size and buff axillaries.

The almost cosmopolitan genus *Numenius* is remarkable for its prolonged decurved bill, and its elongated legs. *N. arquata,* the Curlew or Whaup, breeds freely on the moorlands of Britain, and extends throughout Northern Europe and Asia to Lake Baikal ; after breeding it visits the Atlantic Islands, the whole of Africa, and the Indian Region. The plumage is pale brown with darker streaks, the rump, tail, and axillaries being white, and the two

latter barred with dark brown; the belly is white, the breast nearly so in winter. Found on our shores from autumn to spring, its wary habits are as well-known as its wild rippling note; the food consists of insects, worms, berries, and so forth; while four large pear-shaped olive-and-brown eggs are deposited in an ample depression formed on boggy or heathery ground. *N. cyanopus*, a distinct East Siberian form, met with in Australia and occasionally from New Guinea to Borneo in winter, has the rump-region brown

FIG. 59.—Curlew. *Numenius arquata*. $\times \frac{1}{5}$.

and black. *N. tenuirostris*, of the Mediterranean and South Russia, resembles the Curlew, but is much smaller; *N. longirostris* of temperate North America, migrating to Central America and the Antilles, has cinnamon axillaries—like all the New World members of the genus—and a dark rump. The remaining species, or Whimbrels, have a pale central streak down the crown, less distinct in *N. borealis*, the Eskimo Curlew, which has rufous axillaries barred with brown, and a rump like the back. This bird wanders to Britain, but breeds in the extreme north of America, and in winter reaches the south of that Continent. *N. phaeopus*, the typical Whim-

brel or May-bird, nests in the Shetlands and perhaps still in the Orkneys and North Ronay in the Hebrides; in summer it takes the place of the Curlew in the Färoes and Iceland, strays to Greenland, and occupies Northern Europe and Asia; while it visits the Azores, the whole of Africa, the Indian Region, and Australia in winter. Specimens from Eastern Asia, with more streaked rumps, have been separated as *N. variegatus*. In general plumage and habits the Whimbrel resembles the Curlew; it is, however, much smaller, the cry consists of sharper and more quickly repeated notes, and the parents, though anxious, are less shy at the nest. They often descend in a gyrating fashion, closing one wing. *N. hudsonicus*, of Arctic North America, which winters throughout South America, and has once occurred in Spain, resembles *N. borealis* in its cinnamon axillaries, but is larger and less ruddy beneath. *N. tahiticnsis*, common in the Pacific Islands, and probably breeding in Alaska, is recognisable by the bristly-pointed flank-feathers; *N. minutus*, ranging from East Siberia in summer to the Malay Islands and Australia in winter, has the back of the metatarsus as well as the front scutellated.

Sub-fam. 3. *Scolopacinae.*—*Macrorhamphus griseus*, the "Dowitcher," breeding in the extreme north of North America, and its larger and brighter western race, *M. scolopaceus*, are rufous birds with darker variegations, the lower back and tail being white, but the latter and its upper coverts shewing blackish barring. The bill is widened towards the tip, while in winter the plumage is grey and white. One form or the other has strayed to Britain, Western Europe, and Eastern Asia, the range on migration reaching Brazil and Chili. The habits resemble those of Redshanks. *M. taczanowskii*, with black-mottled rump, occupies East Siberia, and winters in India, Borneo, and thence to China.

Scolopax rusticula, the well-known Woodcock, brown, grey, and buff in colour, with blackish vermiculations and blotches above and bars below, has two transverse buff stripes on the black hind-crown. It inhabits Northern and Central Europe and Asia—with the Atlantic Islands and Japan—and migrates to the Mediterranean, Persia, India, Ceylon, and China, or even strays to eastern North America. Breeding freely in Britain, where large additional flocks arrive in autumn, it frequents leaf-strewn woods in which marshy spots or rivulets alternate with dry ground; the food consists of worms, small molluscs and insects, the first being

obtained by probing the soil with the long sensitive beak. The flight is rapid and steady, the note—not uttered when flushed—is whistling; while during incubation a curious habit prevails among the cocks of "roading" or traversing fixed routes at twilight, and uttering hoarse notes. The nest is a depression, usually lined with dry leaves; the four eggs, much larger and rounder than those of the Snipe, are creamy-buff with pale brown, grey, and lilac markings. The young are often carried by the parents between their thighs, the bill probably aiding to steady them. Woodcocks[1]

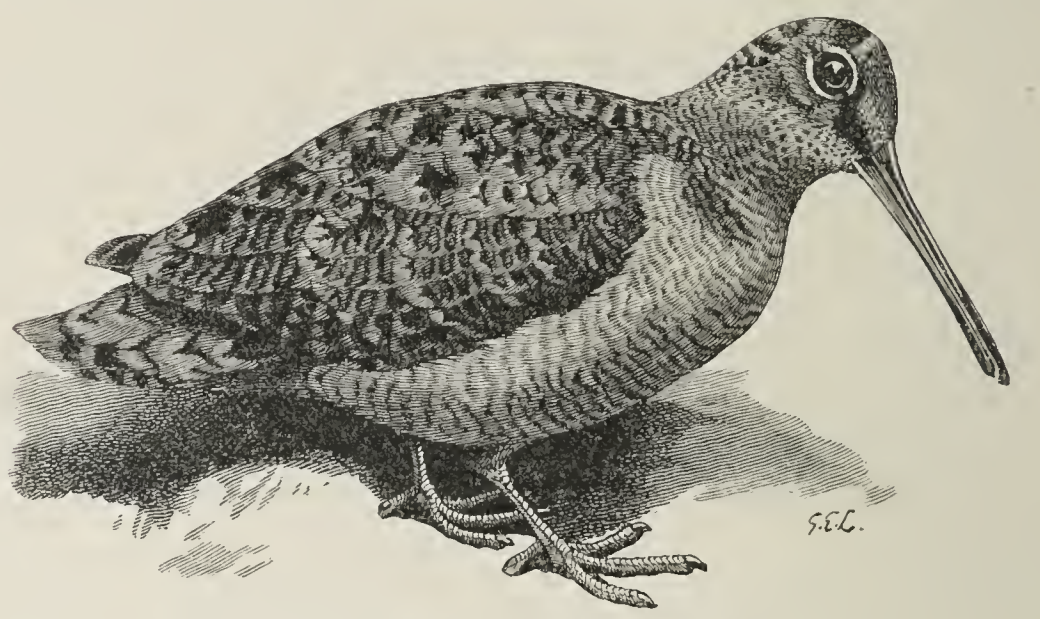

FIG. 60.—Woodcock. *Scolopax rusticula.* $\times \frac{2}{7}$.

are now seldom snared or netted in England. *S. saturata* of Java and North-West New Guinea is a darker bird with almost uniform black primaries, and a white abdomen with dusky bars. *S. rochusseni* of the Moluccas has partly bare tibiae, like many Snipe, and a nearly plain buff breast. The Woodcock of eastern North America is *Philohela minor*, which has the three outer primaries curiously attenuated.

The genus *Gallinago* differs from the above in having longitudinal stripes on the head. *G. caelestis*, the Common or Full Snipe,[1] breeds in Northern and Central Europe and Asia, and even in North Italy; it is recorded from Greenland and the Bermudas, and migrates to the Atlantic Islands, the Gambia, the Upper Nile, and the Indian Region. Its brown, black, and buff plumage, with three buff streaks on the head, is well-known, while there are normally fourteen rectrices. *G. sabinii* is merely a dark form. As regards its autumnal influx and food the Snipe resembles the Woodcock, but the cry of "scape-scape" and twisting

[1] For the nerves of the bill, see Yarrell's *Brit. Birds*, 4th ed. iii. 1882-84, pp. 346, 347.

flight on rising, remain to be mentioned, while the alternate zig-zag rise and fall of the bird when circling in the air near its nest, with the curious drumming or bleating noise produced at each descent must not be omitted. The method of production of this sound is still uncertain, but is either due to the vibration of the wings, or more probably to that of the webs of the outer rectrices. The slight nest is formed in a tuft of herbage in some marshy place, the four pointed eggs being olive, with spots and oblique blotches of brown. Snipe occasionally perch on trees or squat upon the ground until touched. The very similar *G. delicata* (*wilsoni*), breeding northwards from the northern United States, and migrating to northern South America, has usually sixteen rectrices, as have the six following species. *G. major*, the Double or Solitary Snipe, nests as far south in Europe as Holland and Poland, and reaches the Yenesei; it is known from the Tian-Shan Mountains, Turkestan, and Persia, and winters even in Natal and Damara-Land, visiting Britain annually on passage. It rises silently and heavily when flushed, is to some extent nocturnal, and drums when on the ground. The three outer tail-feathers are chiefly white.[1] *G. frenata*, ranging from Argentina and Tarapacá to Venezuela and Guiana; *G. nobilis* of Colombia and Ecuador, *G. paraguaiae*, reaching from Amazonia and Bolivia to the Falklands, *G. macrodactyla* (*bernieri*) of Madagascar, and *G. aequatorialis* (*nigripennis*), of the Ethiopian Region generally, conclude this section of the genus. *G. australis* is similar to our Snipe, but larger; it breeds in Japan, and migrates through Formosa to Australia; *G. nemoricola*, the Wood-Snipe of the hills of India and Burma, has the lower parts distinctly barred; *G. solitaria*, breeding at considerable elevations from Turkestan to Assam and Japan, and wintering in those countries and China, exhibits distinct white streaks above. In the three last-named species the rectrices number about eighteen, in the next six they may be as few as fourteen. South America furnishes five forms somewhat like Woodcocks in their habits and eggs, namely, *G. gigantea* of Brazil and Paraguay, the largest of the Snipes; *G. undulata* of Guiana; *G. jamesoni*, ranging from Colombia to Bolivia; *G. imperialis* of the former country; and *G. stricklandi* of Chili and Patagonia. All these recall the Common Snipe by their coloration, as does the small short-winged *G. aucklandica*, which, with its different races,

[1] For habits, see Dresser, *Birds of Europe*, vii. 1871-1881, pp. 635-637.

occupies the Auckland, Snares, Chatham, and Antipodes Islands, and has visited New Zealand. *G. stenura*, the Pin-tailed Snipe, with twenty-six rectrices, the eight outer of which on each side are stiff and attenuated, breeds from the Yenesei to the Pacific, and winters in the Indian Region; *G. megala*, with twelve of its twenty tail-feathers narrowed, inhabits East Siberia and passes through Japan to China, the Philippines, Borneo, and the Moluccas in winter. *G.* (*Limnocryptes*) *gallinula*, the Jack Snipe, found in Britain from autumn to spring, breeds from Scandinavia to Siberia, and migrates to North Africa, the Indian Region, and Japan. The upper parts show a greenish and purple gloss, while it has only twelve rectrices. Like *G. major*, it frequents drier spots than the Common Snipe, and rises without a sound in the shooting season, the flight being butterfly-like; the habits in summer are similar to those of the last-named species, and the eggs even larger for its size.

Of the so-called Painted Snipes the female of *Rhynchaea* or *Rostratula capensis* has a brown head with chestnut cheeks and collar, a brownish-green back with blackish freckling, scattered golden-buff ocelli and streaks on the upper parts, a black fore-neck, a white under surface and ring round the eye. The male is duller, without the chestnut tints. This species inhabits the whole Ethiopian and most of the Indian Region, as well as Egypt, Arabia, and Japan; the larger *R. australis*, with only a chestnut patch on the nape, occupies Australia. *R. semicollaris* of Chili and Patagonia, which visits Peru and Brazil, shews no chestnut collar, but has black upper wing-coverts with round white spots; the sexes being alike. In mature females of the Old World forms the trachea extends in a loop or loops over the furcula, or even over the pectoral muscles.[1] The habits of these birds are Snipe-like, but the flight is slower, and the hen's note purring; the whitish eggs with plentiful black spots are somewhat Plover-like, while *R. semicollaris* apparently lays only two. The Indian species is said to hiss at intruders, with its wings and tail expanded into a disc.

The short-winged *Phegornis mitchelli*, which lacks a hallux, is brown above, and white with very close dusky bars below; the head is black, save for a white band which surrounds the occiput; while a neck-collar is formed by a fine orange patch behind and a white area in front. It inhabits the Andes from Peru to Chili.

Fam. II. **Chionididae.**—This group—with *Dromas*—possibly

[1] Wood-Mason, *P.Z.S.* 1878, pp. 745-751; Gould, *Birds of Australia*, ii. 1865, p. 275.

connects the Charadriidae and the Laridae. The peculiar bill and short, entirely reticulated metatarsus have already been mentioned (pp. 268-269), while both sexes are pure white, the downy young being grey. *Chionis alba*, the "Kelp Pigeon" of the Falklands, which inhabits the Straits of Magellan, New Year Island, South Georgia and Louis-Philippe Land, and has once been shot in Ireland, has the bill pinkish or yellowish with a black tip and flat sheath; the bare face is covered with whitish papillae, and the feet are bluish. *C. minor*, of Kerguelen Land, Prince Edward and Marion Islands, and the Crozets, has the sheath protuberant, the bill and facial carmncle black, and the feet pinkish. There is said to be a blunt black carpal spur, less prominent in the female. Both species are often found at sea, flying strongly, or sailing with outspread wings; but on land their appearance, gait, and manner of courting are curiously like those of Pigeons. The note is a gentle chuckle; the food consists of mussels—which they break with ease—crustaceans, sea-weed, and even eggs of other birds; their own eggs, two or rarely three in number, are of the Oyster-catcher type, but commonly redder in the markings, so that they recall those of the Razor-bill or Tropic-bird. When the flocks separate into pairs for breeding, they are tame and inquisitive, while they fashion a nest of dried plant-stems in hollows among rocks, or occasionally in Petrels' burrows.

Fam. III. **Glareolidae.**—Of these Old World forms Sub-fam 1, *Glareolinae*, includes the genera *Glareola*, *Cursorius*, *Pluvianus*, and perhaps *Ortyxelus*, the first two having the middle claw pectinated, and *Glareola* a short, stout bill with wide gape, a forked tail, and long pointed wings. *G. pratincola*, the Pratincole, which occasionally visits Britain by way of Western France, breeds in Southern Europe and North Africa, and extends to Sind and the Tian-Shan Mountains in Asia, migrating to other parts of India and to South Africa. It is brown above, with blacker wings and tail, the secondaries having white tips, and the rectrices white bases and coverts: the throat is buff, surrounded by a black line, the breast brownish, the abdomen white; the axillaries and inner under wing-coverts are chestnut, the bill and feet blackish, with red base to the former. *G. orientalis*, found from Mongolia to Ceylon, the Malay Archipelago, and North Australia, has the tail less forked and little white on the secondaries; *G. ocularis*, of Madagascar, recorded from Mauritius and East Africa, has a pale chestnut

breast, and the outer pair of rectrices white with broad black ends; *G. melanoptera* (*nordmanni*) of South-East Europe and West Asia, migrating to South Africa, has black axillaries and under wing-coverts, as have the long-legged *G. grallaria* (*isabella*) with slightly forked tail and chestnut flanks, which breeds in Eastern Australia and occurs from New Guinea to Borneo, and the small grey-backed *G. lactea* of India, Ceylon, and Burma, with much white on the wings. The other species have reddish feet, fading to yellow; *G. cinerea*, ranging from the Niger to the Congo, possesses a rufous nuchal collar and white axillaries; *G. nuchalis* of the White Nile, and the hardly separable *G. emini* of Foda in Equatorial Africa, have a white collar and grey axillaries; *G. megapoda*, extending from Liberia to the Niger, shews a rufous collar and grey axillaries. The last five forms, and *G. ocularis*, have the tail merely emarginated. Pratincoles have a shrill, screaming note and Swallow-like flight, insects, on which they feed, being ordinarily captured on the wing; but the general habits are those of Plovers, the birds running very fast, and the parents often swooping down upon an intruder, or cowering on the ground to draw attention from their brood. They frequent sand-banks, lagoons, bare plains, or coast-lands, laying two, three, or rarely four oval greenish-buff or greyish eggs, with purplish-black, brown, and grey marblings, without any nest, on the sun-baked mud.

The genus *Cursorius*, or Courser, inhabits the hotter portions of the Old World. *C. gallicus*, the Cream-coloured Courser, which visits Britain and the southern half of Europe irregularly, is met with in the Canary and Cape Verd Islands, North Africa, and the countries from Arabia to Northern India. The brown bill is thick and decurved, the whitish legs are long; the plumage is buff, with slaty nape, black remiges, axillaries, under wing-coverts, and subterminal tail-bar; the face is white with a black post-ocular streak. Seldom found in flocks, this bird frequents dry sandy plains and deserts, crouching to avoid notice, running with extraordinary speed if approached, but rarely rising on the wing. The flight, however, is at times protracted. The food consists almost entirely of insects, such as grasshoppers, yet it includes small molluscs; the note is harsh; while two, or exceptionally three, round stone-coloured eggs with grey and brown markings are deposited on the bare ground. The axillaries and under wing-coverts are greyish-buff in *C. somalensis*, of Somaliland, but brownish-grey in *C.*

rufus, of South Africa, which has a black abdominal patch. *C. temminckі* (*senegalensis*), of most of the Ethiopian Region, and *C. coromandelicus*, of India and Ceylon, are similar, but have the nape black and white, the latter possessing white tail-coverts.

In the remaining species (*Rhinoptilus* of some authors) the bill is almost straight. *C. bicinctus* of South Africa is mottled with brown above, having much chestnut on the wings, white tail-coverts, and buff under parts crossed by two black pectoral bars. *C. bisignatus*, ranging from East Africa to Benguela, and *C. hartingi* of Somali-Land, are hardly more than races of the above. *C. cinctus* of East Equatorial Africa, and the barely separable *C. seebohmi* of South-West Africa, are easily recognised by the four bands on the white lower surface, the highest and lowest being brown, and the two intermediate black, with a streaky buff space between them. *C. chalcopterus*, of the Ethiopian Region generally, and *C. albifasciatus* with a more distinct white alar bar, are plain brown birds with metallic purple hues on the black primaries, white post-ocular streak and throat, and white belly surmounted by a black band. *C. bitorquatus*, of the districts near Madras, differs in shewing below three successive bands or gorgets, one of rufous and two of brown, separated by white. Though all Coursers agree in general habits, the last three seem to prefer bushy ground, and *C. rufus* will perch in trees.

Pluvianus aegyptius, apparently allied to *Cursorius*, inhabits West and North-East Africa, wandering to Palestine and South Europe, and being even recorded from Sweden. The head, nape, and long mantle-feathers overhanging the grey back are glossy black; the wings and tail are black and white varied with grey, the lower parts rufous-white with a black pectoral band, while a line of white encircles the crown. This bird, called "Zic-zac" from its noisy chattering cry (cf. p. 276), is usually seen skimming swiftly over the water, or running and feeding along the shores. The yellowish stone-coloured eggs, with umber and grey markings, are commonly found buried in the sand, but so are those of the Ringed Plover in wind-swept spots. Probably this species, and not *Hoplopterus spinosus*, is the προχίλος of Herodotus, the Crocodile-bird of later writers, which enters the Crocodile's mouth to feed.

Here may possibly be placed the mottled rufous, black, and white *Ortygelus meiffreni* of West and North-East Africa.[1]

[1] Cf. Sharpe, *Ibis*, 1892, p. 543; but it seems nearer to *Turnix* (p. 187).

Sub-fam. 2. *Dromadinae.*—This contains only *Dromas ardeola*, the curious Crab-Plover, with its straight, hard compressed bill, long legs, webbed toes, and pectinated middle claw. It is white, with the elongated dorsal feathers and most of the wings black, the tail chiefly grey. Found from the Red Sea to Natal, and through the Indian Ocean to the Bay of Bengal, it haunts sandy islands or sandbanks on the coast, flying, running, or walking with equal ease. This bird feeds on small crustaceans, and breeds in company, depositing a single large white egg on the bare sand in a deep burrow, where the young remain for a considerable time.

Fam. IV. **Thinocorythidae.**—The so-called South American "Seed-Snipes" are a generalized group of somewhat Fowl-like birds, with long wings and short legs. *Thinocorys rumicivorus*, of Peru, Bolivia, Chili, Argentina, and Patagonia, is yellowish-brown and black above, with whitish tips to the dark remiges and rectrices, and creamy white below with a black pectoral band, which sends a streak upwards to bifurcate round the white throat. The female has a less extensive band, and an ashy-brown fore-neck. *T. orbignianus*, of Peru, Chili, and Bolivia, differs in its grey breast with no central streak; it has a black border to the throat, and a grey nape, which is absent in the female. *Attagis gayi*, of the same countries, has grey and rufous upper parts with black spots and vermiculations, and pale cinnamon under parts, with a greyish fore-neck shewing fine black lines. *A. chimborazensis* of Ecuador is blacker above and darker below; *A. malouina*, of the Straits of Magellan and the Falkland Islands, has a white lower surface and a rufous chest with round black spots. These forms usually frequent hill-country, and to the north of their range even haunt the higher Andes, living on vegetable substances, and especially seeds of docks and other plants. They run with great celerity over the stony ravines or grassy plains, but they often squat or creep away from intruders; when flushed they rise sharply with twisting flight like the Snipe, and utter a similar cry. On the ground they make curious hollow or whistling noises, the flocks answering one another as they sit, and being very hard to distinguish, from their earthy coloration. The nest of *Thinocorys* is a depression slightly lined with grass, and contains some four drab or pinkish-buff pear-shaped eggs, thickly speckled with chocolate and purplish-grey, which the female is said to cover when she leaves them, while the male anxiously keeps watch from some neighbouring stone.

Fam. V. **Oedicnemidae.**—Of these birds, which lack the hind toe, *Oedicnemus scolopax*, the Stone-Curlew, or Norfolk Plover, a summer visitor to the warrens of East Anglia, and the downs or stony flats of the South of England, ranges from our shores and the Atlantic Islands through temperate Europe and North Africa to Lake Saisan and Burma in Asia. This largest of European Plovers is light brown above and buff below, with blackish streaks throughout; the throat, belly, a line below the eye, and two narrow alar bars are white, the remiges otherwise black, the tail brown, black, and white. The feet, base of the bill, and very large iris are yellow. This skulking semi-nocturnal species flies strongly, though it prefers to squat or run, and takes to the wing reluctantly; towards winter it is gregarious, as are so many of the Charadriiformes. The mournful whistling cry, more mellow than that of the Golden Plover, is chiefly heard at twilight, when the bird feeds upon worms, insects, molluscs, or even reptiles, frogs, and mice. Two oval stone-coloured eggs, blotched or scrawled with black, are laid on bare ground or among stones, and in India sometimes under bushes; while the newly-hatched young are decidedly torpid, contrary to Limicoline custom. Other species with streaked breasts are *Oe. senegalensis*, of West and North-East Africa, with only one white wing-bar; *Oe. vermiculatus*, of East and South Africa, with vermiculated upper parts; *Oe. capensis*, of much the same districts, with coarse blotches and bars above; and the large *Oe. grallarius* of Australia with a broad brown stripe down each side of the neck. *Oe. affinis* of North-East Africa is barely distinct from *Oe. capensis*. The forms with almost uniform breasts, and a black patch or line over the eye, are *Oe. bistriatus*,[1] ranging from Mexico to North Brazil, with mottled, and *Oe. supereiliaris* of Peru with vermiculated, back; as well as two fine birds separated as *Aesacus*. *Ae. recurvirostris*, of India, Ceylon, and Burma, has a stout, slightly recurved bill and nearly plain upper surface; *Ae. magnirostris*, extending from the Andaman Islands to the Philippines, Australia, the Solomons, and New Caledonia, differs in its straight bill and blackish lores. The former breeds on sand-banks up rivers, the latter on sea-beaches, both feeding upon crustaceans and molluscs. Some of the Family occasionally frequent low hills, and *Oe. bistriatus* is kept to destroy insects in Nicaragua.

Fam. VI. **Parridae.**—Of the extraordinary long-toed Jaçanas,

[1] *Oe. dominicensis* of St. Domingo may be distinct from the above.

Parra jacana, ranging from Ecuador and Guiana to Bolivia and Argentina, has a red frontal lappet, bilobed posteriorly, a red wattle at each side of the gape, an orange bill, olive feet, and a well-developed yellow carpal spur. The plumage is chestnut, with greenish-black head, neck, and under parts, maroon sides, and yellow remiges, the wing- and tail-quills being tipped with brownish-black. *P. melanopygia* of Panama and Colombia is darker and more maroon above; *P. nigra*, of those countries and Venezuela, is entirely greenish-black, except for the wings; *P. gymnostoma* (*variabilis*), found from South Texas to Costa Rica, with Cuba, Porto Rico, and Haiti, has the frontal lappet trilobed, lacks the rictal wattles, and in colour resembles *P. melanopygia*, though the maroon extends to the belly. The young in this genus are chiefly bronzy-brown above and buffish-white below; and the nestlings—at least in *P. gymnostoma*—are curiously marked with tawny, black, buff, and white. *Metopidius indicus*, occurring from India to Cochin China, and in Sumatra, Java, and Celebes, has a large blue frontal shield, small blunt spurs, and no rictal wattles; the bill is pink, blue, and green; the feet are slaty. The head, neck, remiges, and under parts are greenish-black, varying to purple, the chin and superciliary streak are white, the mantle is bronze, the lower back maroon, and the tail chestnut. The young are much greener above than in the last genus. *M. albinucha* of Madagascar and *M. africanus* of most of the Ethiopian Region have a smaller shield, loosely connected behind, which is grey in the former, leaden blue in the latter, as are the bill and feet. The cinnamon-brown plumage is varied in the first-named by a black occiput and throat and white nape, in its congener by a white neck, black nape, and golden upper breast. The tail is chestnut and the primaries black. The very small *Microparra capensis*, of South and South-East Africa, has no shield or wattles, and is greyish-brown, becoming orange on the crown, rump, and tail; the nape and upper mantle are purplish-black, the wings blackish with a white alar bar, the under parts white with golden sides to the neck. The bill and feet are brownish, the spur in this genus and the next being as in *Metopidius*. *Hydraleetor gallinaceus*, ranging from Borneo and Celebes to New Guinea and Australia—if *H. novae guineae* be not separated—is chiefly black; the back being greyish-olive, the throat and abdomen white, the cheeks, with the sides and front of the neck, golden. A red lappet with an erect central protuberance covers the forehead; the bill is

red, yellow, and black; the legs are red and olive. Young birds are mainly reddish-brown, with white below. *Hydrophasianus chirurgus*, of most of the Indian Region, is bronzy-brown above and purplish-black below, with no fleshy outgrowths, but a large, sharp spur. The head is white with black occiput, the neck golden behind and white in front, with an intervening black lateral stripe; the wings are mainly white, with curious filamentous appendages to the attenuated blackish outer primaries; the four median feathers of the dark brown tail are enormously elongated and decurved. The winter and immature plumage is almost

Fig. 61.—Indian Jaçana. *Hydrophasianus chirurgus*. $\times \frac{1}{4}$.

entirely bronzy-brown, with white under surface crossed by a black gorget; but the young have a rufous head.

All the members of this Family frequent lakes and swamps, whether inland or near the coast, *Hydrophasianus chirurgus* occurring at considerable elevations; while at least that species, *Parra jacana*, and *Metopidius indicus*, are gregarious in winter. On their favourite lagoons, bordered by a dense fringe of aquatic plants, these active birds may be seen gracefully striding or running upon the floating leaves of water-lilies and like plants, as their long toes easily enable them to do. When danger threatens they crouch or submerge themselves partially, *Hydralector* being perhaps the best diver, where all are good. Tame when unmolested, they rise reluctantly, scuttling over the water with

trailing legs after the fashion of a Moor-hen, or fluttering and gliding in turn to the nearest shelter at a good pace. On the ground the gait is easy. Small parties of *Parra jacana* are said to gather together when feeding, and to utter quick, excited cries, while going through a singular performance or dance, with outstretched, agitated wings and alternate slow and fluttering movements.[1] Some species are especially quarrelsome; *Microparra* has a habit of bobbing its head up and down like a Plover; the male of *Parra jacana* is particularly sedulous in warning the female from the nest; and both parents commonly "sham wounded" to protect their young. The cry is loud and harsh, or mewing in *Hydrophasianus;* the food consists of insects, molluscs, seeds, and roots; the nest is a small cup, or not uncommonly a large mass, of aquatic herbage, placed in grass or rushes, or on floating vegetation. The four beautiful eggs are more or less pear-shaped, and are glossy buff, olive, green, or brown, thickly covered with fantastic scrawls, and occasionally with black or brown blotches. *Metopidius indicus*, however, is said to lay as many as ten, while those of *Hydrophasianus* are plain brown or green.

A fossil Limicoline form, *Palaeotringa*, occurs in the Cretaceous rocks of New Jersey; France furnishes *Limosa* and *Tringa* from the Eocene, *Camascelus* (allied to the Plovers) from the transition beds, *Milnea* (near *Oedicnemus*), *Tringa*, *Himantopus*, and *Numenius* from the Miocene. The same formation in both France and Germany provides *Helornis* (akin to *Limicola*), and *Totanus;* the Pliocene of Italy the latter; *Gallinago* is found in the Chatham Islands; *Charadrius* in North America.

Fam. VII. **Laridae.**—This consists of four Sub-families (1) *Stercorariinae* or Skuas, (2) *Larinae* or Gulls, (3) *Rhynchopinae* or Skimmers, and (4) *Sterninae* or Terns. Mr. Saunders[2] is, however, probably right in distinguishing a second Family, *Stercorariidae;* and possibly a third, *Rhynchopidae*, might be admitted.

In the *Larinae* the strong, horny bill is of moderate length, though exceptionally small in *Rhodostethia*, the maxilla being curved, but hardly hooked; in the *Stercorariinae* there is a distinct hook, and the base is covered by a cere, said to be hard or soft according to the season, and possibly shed after the manner of certain Auks.[3] In the *Sterninae* the beak is nearly straight and

[1] Hudson, *Argentine Ornithology*, ii. London, 1889, p. 163.
[2] *Cat. Birds Brit. Mus.* xxv. 1896, p. 3. [3] Stejneger, *Stand. N. H.* iv. Boston, 1885, p. 75.

pointed, while comparatively slender; in the *Rhynchopinae*, the maxilla, which moves vertically with ease, is much shorter than the mandible, and both are compressed anteriorly until they resemble truncated knife blades. The tibia is generally partly bare; the metatarsus is fairly long in the first two Sub-families, and is scutellated in front, being usually smooth behind, though rougher in *Pagophila;* the anterior toes are fully webbed, with claws which vary from weak to moderate, or even to strong and hooked, as in the *Stercorariinae*. The elevated hallux is joined by a membrane to the inner toe in *Leucophaeus*, and is rudimentary or absent in *Rissa*. In the *Sterninae* and *Rhynchopinae* the metatarsus is short — especially in the latter, where the web between the inner and middle digits is deeply incised, as are both webs in *Hydrochelidon* and *Gygis;* the claws are long, slender, and curved. The pointed wings, excessively lengthened in the two last-mentioned Sub-families, have eleven primaries, of which the outer is particularly small, and from fifteen to twenty-three secondaries. The tail may be nearly even as in *Larus*, deeply forked as in *Sterna* generally, less excised as in *Xema*, *Hydrochelidon*, *Nacnia*, and *Rhynchops*, graduated or cuneate as in *Rhodostethia*, *Anous*, and *Gygis;* all the twelve feathers being rounded or acute: in the *Stercorariinae* the two central rectrices project beyond the others, being decidedly pointed in *Stercorarius crepidatus* and *S. parasiticus*, but rounded and twisted in the shaft until the webs are vertical in *S. pomatorhinus*. The furcula is U-shaped, the syrinx tracheo-bronchial, the tongue lanceolate, the nostrils are pervious; an after-shaft is present, while both adults and young have abundant down, that of the latter commonly shewing a mixture of white, with grey, yellowish, slaty, or brown. *Nacnia* has elongated plumes at the gape, and a few Terns have slight nuchal crests.

Gulls and Skuas are widely-ranging and essentially marine birds, even those species which nest inland being commonly observed near salt water, and seeking the coast when incubation is over. They are always inclined to be gregarious, and are more or less resident in Britain, but the undoubted influx of birds from abroad in autumn makes it difficult, or even impossible, to determine their exact status in every case. Their untiring and easy flight is only second to that of the larger Petrels; the majestic style of the Great Black-backed Gull, and other forms, being a great contrast to the wavering but graceful movements of the Kittiwake or

Bonaparte's Gull. All walk well, though sedately, swim to perfection, and rise easily both from land and water, usually breaking into a run before taking to the wing from the ground; while they almost invariably alight with uplifted pinions. The wild characteristic note varies less than in most large groups, that of the bigger species being harsh and querulous, that of the smaller "laughing" or screaming; the lesser Skuas give vent to a curious mewing cry, and the Great Skuas to a similar but deeper sound. At the breeding-quarters the utterances are naturally more agitated and shrill, and the parents hang excitedly above a visitor's head. The food consists mainly of fish, molluscs, crustaceans, and worms, but is varied in the stronger forms by small mammals, young birds, and eggs: the Great Black-backed Gull undoubtedly attacks lambs and weakly ewes; carrion is not uncommonly devoured; and *Larus maculipennis* acts as a scavenger at Buenos Aires, besides clearing the country of grasshoppers, and robbing the Cayenne Lapwing of its insect booty. Skuas give chase to their smaller kin, and force them to disgorge the fishes they have just caught, while even Solan Geese are sometimes victimized; *Larus scopulinus*, moreover, which robs the Oyster-catcher of New Zealand, is a further instance of parasitic habits. Insects and their larvae, turnips, berries, and grain are also eaten by these omnivorous but useful creatures. Their main sustenance is naturally derived from the ocean, or its oozy shores; but flocks are commonly seen on pastures and arable lands near the beach, or following the plough further from the sea, though not being of the species which breed in the interior, nor driven inland by stress of weather. At times Gulls almost, if not quite, disappear below the water when swooping on their prey, and Kittiwakes have been said to pursue it beneath the surface. A common habit is that of preening and washing the plumage in company at favoured spots, while one that is less well-known is that of casting up the indigestible parts of the food in pellets, as do many other birds. The nesting sites are very frequently precipitous rocks and stony islands, but inland marshes and lakes accommodate many species, while in certain localities trees as high as thirty feet are selected. Skuas breed on moors or hills near the sea in Scotland, on the fells of Scandinavia, and on the tundras and barren grounds of the Arctic Regions, the nest being a mere depression in the herbage or moss; the

remainder of the tribe generally collect a mass of grass, moss, flags, sedges, heather, twigs, or sea-weed, though a mere hollow in the soil or sand often serves their purpose. The eggs vary in number from two in the case of the Ivory Gull and the Skuas to three or exceptionally four; they are brown, drab, or green, with blotches and spots of brown, black, grey, and lilac, and recall those of Plovers. Both sexes have been said to incubate in *Larus minutus* and *Rissa brevirostris;* the young are comparatively helpless for a few hours or perhaps days, and are at first fed by the parents.

Terns resemble Gulls in many of their habits, but are more cosmopolitan, and decidedly migratory in Britain; they are essentially marine, yet some species breed on inland waters in summer. Particularly slender and graceful, these long-winged birds may usually be distinguished by their irregular or hovering flight, and are known as Sea-swallows; while their method of beating up and down maritime streams or shallows, singly or in pairs, in search of fish, is quite peculiar to themselves. At such times they make constant plunges into the water, often completely immersing their bodies, or occasionally discontinue their operations to engage in trivial and seemingly amicable quarrels. The note, though hoarse in some cases, is usually a squealing or grating sound, the latter especially when disturbed; the food consists of fish and crustaceans, insects—said to be sometimes taken on the wing—frogs, newts, locusts, grasshoppers, caterpillars, leeches, molluscs, and medusae. Terns are wary but bold, commonly circling around a wounded companion until several are shot; the Noddies (*Anous*), however, are much more sluggish and silent. On the ground all move with comparative ease. The nest of *Hydrochelidon* is a mass of water-weeds placed on some tussock in a wet inland swamp; that of *Anous*, when situated on trees, bushes, or rocky ledges, is composed of twigs, sea-weed, and like materials; but most species merely make a hole in the sand or soil, with little or no lining. Depressions on level rocks, the surface of prostrate plants, and heathery, grassy, or muddy flats are often utilized as alternatives, while colonies are usually formed. Two or three olive, reddish-brown, green, or stone-coloured eggs, with blotches, spots, scrawls, or oblique streaks of black, brown, grey, or lilac, are deposited; the Noddy and Sooty Terns, however, have a single white egg with red markings, and *Gygis* one, which is buff, marbled, spotted, or often scrolled with brown and grey, and is laid on any slight cavity of

a branch, a broad leaf-stalk, or a coral reef. The nesting habits of *Naenia* are unknown, but it frequents rocky, cavernous shores.

Rhynchops has a peculiarly low flight, rapid and gliding, with many a turn and twist, which has gained it the name of Skimmer. The food, often sought towards evening, appears to consist of small fish and crustaceans; it is procured by keeping the bill wide open, with the long mandible ploughing through the water or mud, and leaving a distinct furrow in its track. The cry is a low harsh scream or shrill twittering note. A hollow in some sandy river-bank or island serves to contain the three or four grey, green, buff, or white eggs, with blotches and streaks of purplish-grey and dark brown. The female is said to sit only at night or in stormy weather, and the young to be unable to fly for several weeks,[1] but the remaining habits resemble those of Terns.

The sexes in the Laridae are invariably similar, the plumage being grey and white, or more rarely blackish or brown, details of which will be found below. The young are duller, being mottled with brown or black in immature Gulls. The frequent black or brown heads, often lacking at certain ages or times of year, the seasonal changes generally, the neck-collar of *Xema sabinii* and *Rhodostethia*, and the rosy tint on the breast in the latter species, *Larus franklini*, and *Sterna dougalli* may be noticed in passing. The members of the Family range in size from the Glaucous to the Little Gull; the largest Tern being the Caspian, and the smallest, as its name indicates, the Least Tern.

Sub-fam. 1. *Stercorariinae*.—Of this widely spread but curiously distributed group, *Megalestris catarrhactes*, the Great Skua or Bonxie, a fine rufous-brown species, with a white wing-patch which is very conspicuous in flight, breeds in Shetland, the Färoes, Iceland, and possibly north of Hudson Strait, occurring in South Greenland and Norway, and reaching New England and Gibraltar in winter. It nests in colonies, though each pair occupies a distinct area, which the parents defend with exceptional boldness, swooping down swiftly with a heavy rush, and dropping the feet when at close quarters, as if to strike an intruder. Unlike their smaller kin, which will attack a man from any side and hit him with their wings, these birds commonly aim directly at the face, and their onslaught, if not averted, is really dangerous, while they only just clear the head when threatened with a stick. The two eggs, deposited in a depres-

[1] Baird, Brewer, and Ridgway, *Water Birds N. Amer.* ii. 1884, p. 194.

sion in the herbage, are dull brown or greenish, with somewhat indistinct umber markings. The food consists chiefly of fish, which the smaller Gulls are forced to disgorge, while Kittiwakes and the like are themselves occasionally devoured in default of other prey. *M. chilensis*, spotted with chestnut above, and more rufous below, occupies America south of Rio de Janeiro and Callao; the sooty-brown *M. antarctica*—the stouter-billed Port Egmont or Sea Hen—replacing it from the Falklands to the Australian and New Zealand seas, and reaching northwards to the Comoros and Madagascar. In the Antarctic Victoria Land occurs a paler form, *M. maccormicki*.

Stercorarius pomatorhinus, the Pomatorhine Skua, breeds on the tundras of Siberia and possibly from Greenland to Bering Sea, migrating to Britain and as far as South Africa, North Australia, and Peru. The plumage is brown, with blacker head and gorget, white breast, and acuminate white neck-feathers tipped with yellow. The projecting median rectrices with their vertically twisted vanes are mentioned above (p. 301). Uniform brown specimens may be immature. *S. crepidatus*, the Arctic Skua, is smaller, and nests as far south as Northern and Western Scotland, but properly occupies Arctic and sub-Arctic Europe, Asia, and America; in winter, it reaches South Africa, Australia, New Zealand, and Brazil. The elongated rectrices are not twisted, but are pointed, while a uniform dark phase—the true *S. richardsoni*—is common to both sexes. *S. parasiticus*, Buffon's Skua, distinguished from the last-named by its extremely prolonged rectrices and greyer upper surface, breeds on the Scandinavian fells and throughout the Arctic tundras and barren grounds, migrating as far south as Gibraltar and lat. 40° N. in America. The habits of the members of this genus are similar to those of *Megalestris*, but their quicker flight enables them to rob even Terns, and the mewing cry is most peculiar, while the eggs are intermediate in style between those of Whimbrels and Gulls. These small Skuas often destroy Lemmings.

Sub-fam. 2. *Larinae.*—*Rissa tridactyla*, the Kittiwake, breeds from the circumpolar regions southwards to the Kuril Islands, the Gulf of St. Lawrence, and North-West France; in winter it reaches western North America, the Bermudas, the Canaries, the Mediterranean, and the Caspian. The feet are black, the hind-toe is absent or rudimentary. From *Larus canus*, which it closely resembles when flying, it can be distinguished by the absence of white spots at the ends of the primaries. The young bird, or

Tarrock, is much variegated with dark grey or black, and has a blackish tip to the tail, as is the case in most fresh-water Gulls. Many fine colonies inhabit the loftier cliffs of Great Britain, the nests of sea-weed and grass being closely crowded together, and the eggs exhibiting softer colours than is usual in the Sub-family. The darker *R. brevirostris* of Bering Sea has red feet.

Pagophila eburnea, the Ivory Gull, seems truly circumpolar, while it accidentally visits Britain, Northern Europe, and New Brunswick. It is pure white, with black feet, the young shewing grey and black variations. It will eat whale- or seal-offal.

Leucophaeus scoresbii, of South Patagonia, the Falkland Islands, and the neighbouring Antarctic seas, has a crimson bill, coarse red feet, with somewhat excised webs, a dark hood in immature examples, and a white tail. *Gabianus pacificus* of Australia and Tasmania is somewhat like *Larus marinus*, but has a very short stout bill and a black-banded tail.

In the genus *Larus*, as throughout this Family, the arrangement followed is that of Mr. Howard Saunders,[1] much of whose admirable work is here incorporated. His first section comprises species with a white tail but no hood, the young having the head striated. Of these, *L. glaucus*, the Burgomaster or Glaucous Gull, and *L. leucopterus*, the Iceland Gull, are the only members of the group with nearly white primaries, the former being larger, with proportionately shorter wings. In summer the former is circumpolar, and the latter occurs from Jan Mayen to Greenland and perhaps the west side of Baffin Bay; in winter both visit Britain, but the latter only reaches the Gulf of Gascony, and Boston in America, whereas its ally extends to the Mediterranean, the Caspian, Japan, California, and the Bermudas. At this season the head shows brown markings; while the young are entirely mottled, though they apparently become creamy white just before assuming the grey mantle. *L. glaucescens* of the North Pacific, *L. nelsoni* of North-West America, and *L. kumlieni* of Cumberland Sound have the quills chequered with grey, and connect the above with the following or blacker-quilled group.

L. argentatus, our Herring Gull, has a blue-grey mantle; the black primaries shew white tips and "mirrors" or round white marks, as well as a grey wedge on the inner web; the feet are flesh-coloured,

[1] *Cat. Birds Brit. Mus.* xxv. 1896; *J. Linn. Soc.* xiv. pp. 390-406; *P.Z.S.* 1876, pp. 638-672; 1878, pp. 155-212.

the orbits yellowish. In winter the head is streaked, and in the young the plumage is mottled with brown. This species extends over Northern Europe and most of North America, ranging to the south of those countries in the cold season; its representative in the Mediterranean and Central Asia is *L. cachinnans*, with yellow feet and red orbits, and in Arctic Siberia *L. vegae*, chiefly differing from the last-named in its pinkish legs. *L. audouini* of the Western Mediterranean has blackish feet, and a crimson bill with black band. *L. canus*, the Common Gull, found throughout Northern Europe and Asia, and migrating to the Mediterranean, the Nile, the Persian Gulf, and China, has white mirrors on the first three primaries, yellow bill, and greenish-yellow feet. It has occurred in Labrador, and breeds in North Britain on islands, lakes, and flat stacks, though rarely, if ever, on cliff-faces; the shrill note is more like that of the Herring Gull than the harsh cry of our Black-backs. The smaller and darker *L. brachyrhynchus* occupies North-Western America, reaching California in winter; the paler *L. delawarensis*, with a subterminal black band on the yellowish bill, frequents lakes and marshes in North America, and breeds towards the north; *L. californicus*, with little black on the beak, inhabits western North America.

Of the Black-backed Gulls, *L. marinus*, the Great Black-back, largest of the Family except *L. glaucus*, is found from Arctic Europe to North-East America, migrating as far as the Mediterranean, the Canaries, and Florida; it has a grey wedge on the primaries like the Herring Gull, and pinkish feet. Somewhat scarce in Britain in summer and comparatively non-gregarious, it is noted for its fierceness, and will even attack sheep. The smaller *L. dominicanus*, with olive feet, ranges from lat. 10° S. in South America to South Africa and New Zealand, with the corresponding Antarctic Seas; *L. schistisagus* of the North Pacific being intermediate between this and the next species. *L. fuscus*, the Lesser Black-back, found both on our shores and inland, has yellow feet; its main range covers North Europe, excluding Iceland; but it even breeds in Morocco and on the Red Sea, extending in winter still further southwards. The similar *L. affinis* of North Russia and West Siberia, with coarser feet, migrates to Somaliland, India, and occasionally other districts; the very stout-billed *L. occidentalis* represents our species on the Pacific coast of North America.

Mr. Saunders's next section contains five Gulls resembling

the last group in having no hood and a white tail; but here the young have the head and tail-coverts unspotted. To this belong *L. bulleri* of New Zealand, the Chatham and Auckland Islands, with black bill and feet, which haunts inland rivers; and also four marine forms with crimson bill and feet. These are *L. scopulinus* of New Zealand, the Chatham and Auckland Islands; the larger *L. novae hollandiae* of Australia, Tasmania, and New Caledonia; the South African *L. hartlaubi*, found in Madagascar; and *L. gelastes*, ranging from North-West Africa and the Mediterranean to the Caspian and Sind, which lays its Tern-like eggs on sand-banks.

The third section differs in having a subterminal black band on the tail, and, in the young, an irregularly striated hood. *L. crassirostris*, of the Chinese and Japanese Seas, has the base of the tail and the under parts white, the bill yellow, banded with red and black, the feet yellowish; *L. belcheri*, of Peru and Chili, has a blackish mantle and stouter beak; *L. heermani* of western North America has the tail black except for a white tip, a grey lower surface, red bill, and black feet; *L. modestus*, also of Peru and Chili, differing in its decidedly grey tail and black beak.

The last-named is a connecting link with the fourth section, containing the Hooded Gulls; that is, those with hoods in mature plumage, but no marked hood in the young. Of these, all except the first three have the mantle grey and the head more or less white in winter; they are rather small birds, which chiefly inhabit the north, commonly breed in marshes, and utter a shrill querulous cry.

L. fuliginosus of the Galápagos, and *L. leucophthalmus* of the Red Sea and Gulf of Aden, are deep lead-coloured above with black head; but the former is grey below with no admixture of white, while the latter has a white nuchal collar, as has the much browner *L. hemprichi*, extending from East Africa to Bombay. *L. cirrocephalus* of Brazil, Argentina, and West and Central East Africa, which occurs in Peru and Natal, has a pale grey head; whereas a brown hood distinguishes *L. brunneicephalus* of Central —and in winter Southern—Asia, *L. maculipennis*, ranging from Brazil to Patagonia and Chili, *L. glaucodes* of Chili, Patagonia, and the Falklands, and *L. ridibundus*, the British Black-headed or Peewit Gull, which occupies Europe and temperate Asia, migrating to North Africa, India, and China. These four differ considerably in the pattern of the primaries,[1]

[1] See Saunders, *Cat. Birds Brit. Mus.* xxv. 1896, pp. 171, 200-219.

but all have red bill and feet. The colonies of our marsh-breeding species supply large quantities of eggs for eating.

Of the black-hooded, grey-mantled forms, which have as a rule red bill and feet, *L. atricilla*, the Laughing Gull, of the Atlantic coast of North America and Western Mexico, alone has black outer primaries; this species and *L. franklini*, of the interior of sub-Arctic America, having exceptionally dark mantles, and the latter pinkish under parts. Both migrate south in winter.

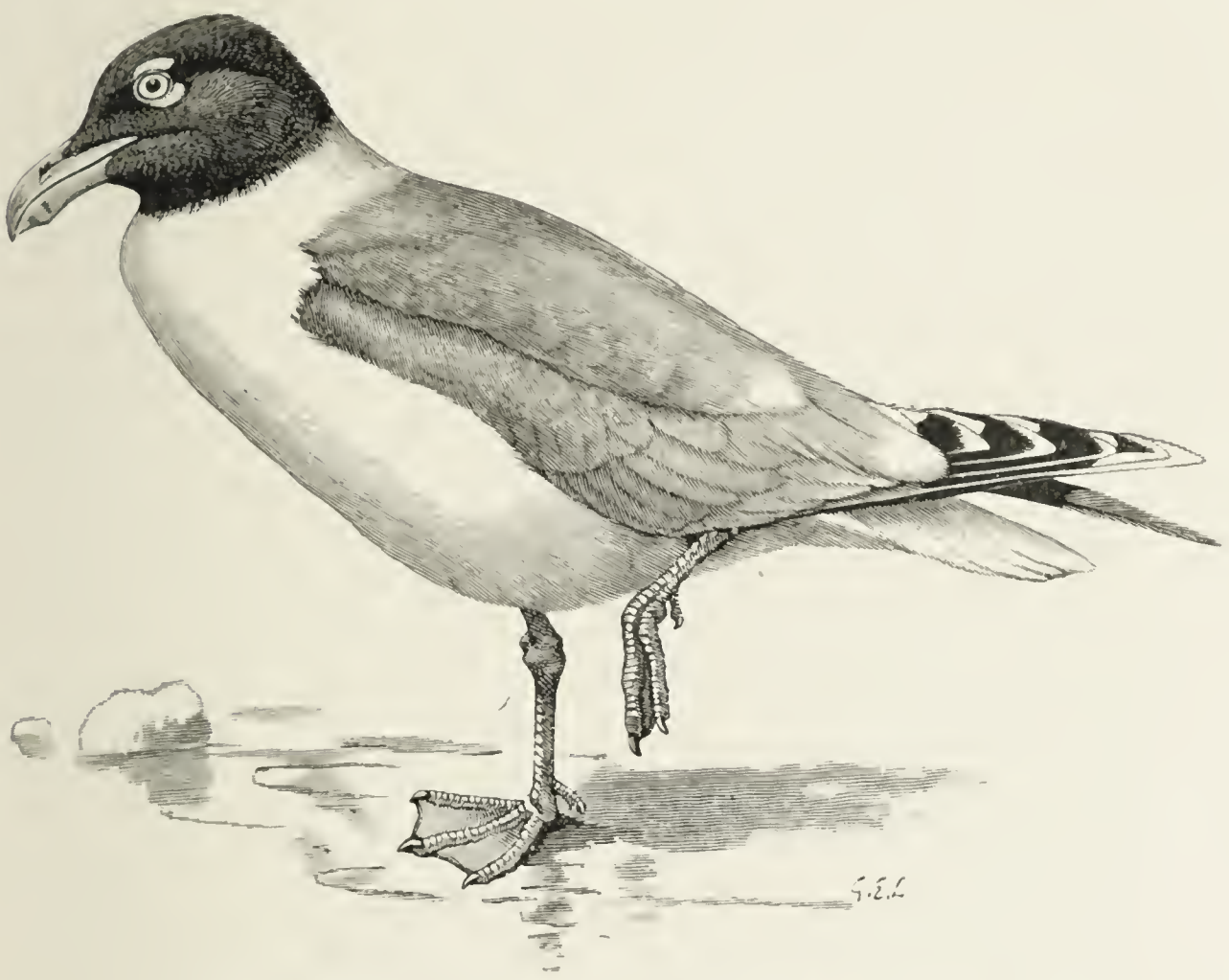

FIG. 62.—Great Black-headed Gull. *Larus ichthyaëtus*. $\times \frac{2}{13}$.

L. philadelphia, Bonaparte's Gull, of all North America, which, like its two following congeners, strays to Britain, has the bill black; *L. melanocephalus*, of the Mediterranean and Black Seas, has a jet black head, a partly red bill, and nearly white quills; the very large *L. ichthyaëtus* ranging from the Black Sea and the Levant to Tibet, and wintering in Southern Asia, has the bill almost orange. *L. saundersi*, a slender-legged stout-billed bird, inhabits the rivers and coasts of China and Mongolia; *L. serranus* of the Andes from Ecuador to Chili being a near ally. *L. minutus*, the Little Gull, frequenting marshy districts in sub-Arctic and temperate

Europe and Asia in summer, and reaching the Mediterranean in winter, is quite the smallest of the genus.

The lovely *Rhodostethia rosea*, or Wedge-tailed Gull, of the North Polar seas, supposed to breed on islets north of Asia and America if not of Franz Josef Land, is easily distinguished by its small black bill, red feet, black collar, and rosy lower parts. One specimen is on record in Britain. *Xema sabinii*, or Sabine's Gull, which nests on maritime marshes from Greenland westward to the Taimyr Peninsula, wanders to Britain, France, the Bermudas, and Texas, and annually visits Peru; it may be recognised by its plumbeous head, black collar, and forked tail. Of the larger collarless *X. furcatum*, with a white basal band on the maxilla, the only five examples known are from the Galápagos and Peru.

Sub-fam. 3. *Rhynehopinae*.—Of this group the curiously compressed beak and the habits have already been described (pp. 301, 304). The sole genus *Rhynehops*, or Scissor-bill, contains five species, of which *R. nigra* is black, with white forehead, cheeks, and lower parts; the wing-quills being also broadly tipped, and the tail-feathers varied, with white. The bill and feet are red, with a black end to the former. In winter the nape is whiter, while the young are buff and blackish above. Breeding from New Jersey to Florida, this bird strays to New Brunswick and migrates to Trinidad, occurring also in South-West Mexico. *R. intereedens* of South Brazil and Argentina, and the larger *R. melanura*, of the North and West of South America, have nearly uniform brown rectrices, but the latter has little white on the secondaries. *R. flavirostris*, extending from Senegal to Damara-Land, and from Egypt and the Red Sea to Nyassa-Land, has a red and orange beak; *R. albieollis*, of India and Lower Burma, differs from it in having the back of the neck white.

Sub-fam. 4. *Sterninae*.—The Terns may be commenced with the snow-white *Gygis candida*, which ranges from the islands east of Brazil to Ascension, St. Helena, Madagascar and its vicinity, the Indian Ocean, the Malay countries, Australia, the Ladrones, the Sandwich Islands and Polynesia generally. The form and habits have been already noticed (pp. 301, 303). The smaller slender-billed *G. mierorhyneha* seems to be peculiar to the Marquesas.

Anous stolidus, termed with its congeners the "Noddies" from their stolid indifference at times to man, chiefly frequents tropical and sub-tropical regions, and has occurred once in Ireland. It is

sooty-brown, with whitish forehead, grey head, black bill and lores, and reddish-brown feet; *A. galapagensis* of the Galápagos being entirely sooty-black above. *A.* (*Micranous*) *leucocapillus*, with a weaker bill and a white crown, has a somewhat more restricted range; *A.* (*M.*) *tenuirostris*, with grey lores, ranges from the neighbourhood of Madagascar to Australia; *A.* (*M.*) *hawaiiensis*, with lighter upper parts, occurs around the Sandwich Islands. These species make a large flat nest of twigs, leaves, grass, and sea-weed, on trees, bushes, or even on the ground, laying one buffish-white egg with scattered red-brown markings. Several pairs often use one tree. *A.* (*Procelsterna*) *cinereus*, extending from Australia to Chili, and *A.* (*P.*) *caeruleus* of Central Polynesia, are nearly grey above, but the former is white beneath. The egg is ordinarily deposited with little or no nest on a bare rock or on sand.

In all the rest of the Sub-family the tail is forked instead of graduated, though less markedly in *Naenia inca* of Peru and Chili, which is leaden-grey, with curling white plumes below the eye, red bill and feet.

The genus *Sterna* contains the more typical Terns or Sea-Swallows, of which the coloration—unless subsequently mentioned—is grey above, and white or lighter grey beneath and on the tail. *S. trudeaui* of Brazil, Argentina, and Chili, which strays to the United States, and *S. melanauchen*, ranging from the Amirante and Seychelles Islands to the Liu Kiu group and Polynesia, are the only two species with the crown white in place of black in the breeding season; the former bird has a black streak through the eye, the latter a band from the lores to the nape.

S. minuta, the Lesser Tern, breeds in many parts of Britain, and extends from about lat. 60° N. in Europe to the Mediterranean, the Caspian, and North India, migrating to South Africa, Burma, and Java. It has a white forehead and belly, black lores, orange feet, and yellow bill with black tip. The two or three whitish or drab eggs, marked with grey and black, differ strikingly from those of the Common Tern and its allies. The larger *S. sinensis* occurs from Bengal and Ceylon to Japan, New Guinea, and Australia; the greyer-rumped *S. antillarum*, the Least Tern, from northern South America to California and New England, or exceptionally to Labrador and West Africa; *S. saundersi*, with nearly black outer primaries, from East Africa to Burma. *S. superciliaris*, with yellow beak, is peculiar to eastern South

America; *S. lorata*, with grey belly, to Peru and Chili; *S. nereis*, with white lores, to Australia, New Zealand, and New Caledonia; *S. balaenarum*, with black forehead and base of bill, to Southern Africa.

S. fuliginosa, *S. anaestheta*, and *S. lunata* are the Sooty Terns, so-called from their dark upper surface; the second being browner and the third greyer than the typical species, wherein alone the young differ from the adults in having brown lower parts instead of white. The forehead is white, the bill and feet are black, while immature birds show whitish markings above. These Terns frequent the tropics, but *S. lunata* only occurs from the Moluccas to Laysan, the Sandwich Islands, and elsewhere in Polynesia. *S. fuliginosa* has been obtained three times in England, occasionally on the Continent of Europe, and in America northwards to Maine. The single egg, like that of the Noddy, but with finer red, grey, and lilac markings, is laid on sand or flat rocks; descriptions of the colony, or "Wideawake Fair," on Ascension having been given by several writers.[1] *S. aleutica* of Alaska, Bering Sea, and Japan, with a slate-grey mantle, white forehead and rump, connects the above with the next section.

The remaining species, with white foreheads, are the large *S. bergii*, ranging from East and South-West Africa to Japan and Polynesia, excluding New Zealand, and *S. bernsteini* of the Seychelles, Rodriguez, Diego Garcia, and Halmahera, both of which have elongated nape-feathers and a yellowish bill, but grey and white rumps respectively. *S. frontalis*, of the New Zealand and Australian Seas, has a black bill.

Of large forms, with black foreheads, black feet, and lengthened nuchal plumes, *S. cantiaca*, the Sandwich Tern, breeding from Britain and the Mediterranean to the Caspian, and from New England to Honduras and both coasts of Guatemala, possesses a black bill. It migrates to Cape Colony, Sind, and Brazil. The large *S. maxima*, and the similar but smaller *S. elegans*, have the beak red; the former extending from about lat. 40° N. in America to Peru and Brazil, and in winter to West Africa; the latter from California to Chili. *S. eurygnatha*, found from Venezuela to Patagonia, only differs in its yellow bill; but *S. media*, ranging from the Mediterranean and East Africa to Australia, has the tail grey instead of white. In this section the richly marked eggs have often a creamy ground.

[1] Cf. Sperling, *Ibis*, 1868, pp. 286-288; Collingwood, *Zoologist*, 1867, pp. 980-983.

One only of the smaller species allied to the last group has blackish bill and blackish-red feet, namely *S. longipennis*,[1] occurring from Lake Baikal and Ceylon to Kamtschatka, Japan, and New Guinea. Of the remainder the Common, Arctic, and Roseate Terns breed in Britain, though the Roseate is decidedly scarce there. *S. fluviatilis*, the Common Tern, occupying the coasts and inland waters of Europe, temperate Asia, and temperate America—chiefly on the eastern side in the last case—and migrating to South Africa, India, Ceylon, and Brazil, has red feet, and red bill with horn-coloured tip, the lower parts being vinaceous grey. *S. macrura*, the Arctic Tern, frequenting the northern regions of Europe and America from

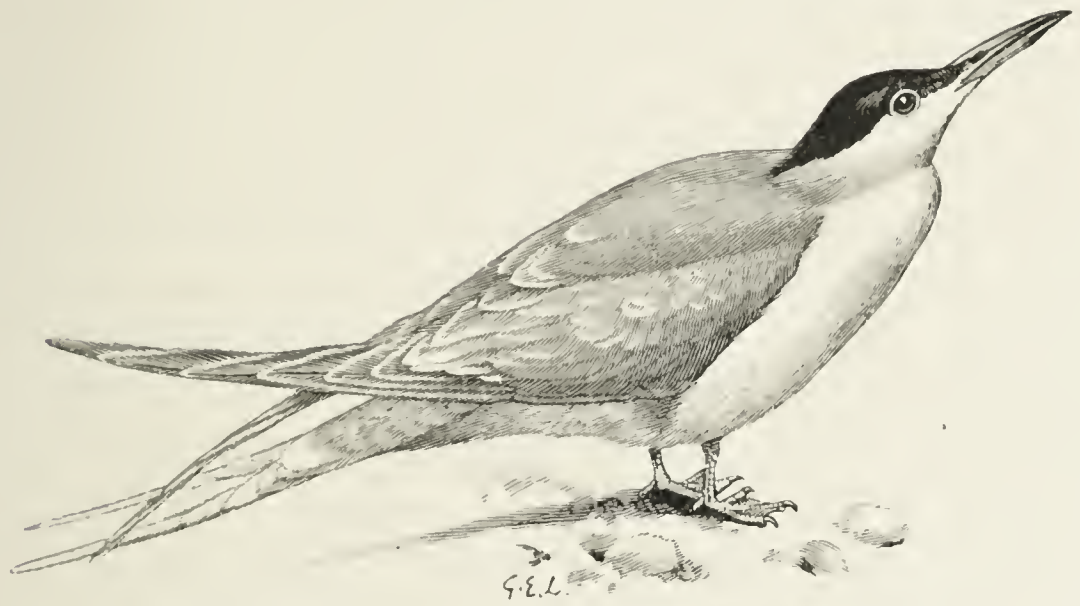

FIG. 63.—Common Tern. *Sterna fluviatilis*. ×¼.

lat. 82° to 50°, and 42° N. respectively, has the bill entirely red, the metatarsus comparatively short, and the breast French grey. The two or three brown-spotted eggs vary from olive to green, and are frequently ruddier than those of the Common Tern. *S. dougalli*, the Roseate Tern, differing in the nearly black bill, the white tips to the inner webs of the primaries, and the evanescent pink tinge on the under parts, is widely distributed from lat. 57° N. in the Atlantic to New Caledonia, but is apparently wanting in the Eastern Pacific. Its cry is peculiarly grating. *S. albigena*, ranging from the Red Sea to the Malabar coast, is much darker, and has orange feet; while *S. hirundinacea*, extending from Brazil and Peru to the regions south of Cape Horn, *S. vittata* of St. Paul's, Amsterdam, Inaccessible, Tristan da Cunha, and Kerguelen Islands, and *S. virgata* of Kerguelen Island and the Crozets are closely allied forms, of

[1] Mr. Barrett-Hamilton, however, calls the feet red in life.

which the last two are said to lay a single egg. *S. albistriata*, with but slightly elongated outer rectrices, yellow bill and feet, inhabits New Zealand and strays to Norfolk Island; *S. forsteri*, with white under parts, orange bill, and reddish feet, inhabits most of North America. *S. melanogaster* of India, reaching northwards to Afghanistan and Bhutan, has a black belly.

Of forms with much stouter bills than *Sterna*, *Seena aurantia*, of India, the Burmese countries and Yunnan, has the bill and feet orange; *Hydroprocne caspia*, the Caspian Tern—largest of the Sub-family—has a very short tail, red bill, and black feet. The latter occupies most of the world, except tropical South America and the Pacific Islands, visiting Britain, and breeding as near to it as Sylt. *Gelochelidon anglica*, the Gull-billed Tern, with a long metatarsus, reddish-black beak and feet, occurs in Britain and is found through the temperate and tropical parts of the Old and New Worlds, but not in South Africa, and rarely in Western America. *Phaëthusa magnirostris*, of the warmer portions of North America, has a short tail, yellow bill, and olive-yellow feet.

The genus *Hydrochelidon*, or Marsh Tern, is distinguished by a short tail, a comparatively small bill, and feet with much indented webs. The note is shrill; the food consists of aquatic insects, varied by frogs, newts, and small fish: the nests, placed in close proximity on swamps or pools, are formed of water plants and are sometimes mere floating masses of them; the three eggs are often very dark olive or brown. *H. nigra*, the Black Tern or Blue Darr, ranges from Europe south of lat. 60° N. and the Mediterranean to Turkestan, wintering as far as Loango and Abyssinia. It bred in the east of England up to 1858, since which date a nest is quite exceptional, while its two congeners are only chance visitors. The colour is lead-grey, with blacker head, black bill and reddish-brown feet. The darker race *H. surinamensis* inhabits temperate America from Alaska and Canada southwards, migrating to Chili and Brazil. *H. leucoptera*, the White-winged Black Tern, is found in Central and Southern Europe, temperate Asia and North Africa; reaching accidentally to America, and in winter from Cape Colony to Australia and New Zealand. It is chiefly black, with white carpal region, rump, tail, and vent, the bill and feet being red. *H. hybrida*, the Whiskered Tern, has a similar range, but breeds also from India to Australia. The main colour is slate-grey, the head and nape being black, the bill

and feet red, and a white streak marking each cheek. In the winter and immature plumage the under parts are entirely, and the head partially white, throughout the genus.

Of fossil Laridae *Halcyornis* occurs in the Lower Eocene of England, *Aegialornis*[1] in the Upper Eocene of France; while the Lower Miocene of the latter country, the Middle Miocene of Germany, and the Pliocene of Oregon furnish *Larus*.

Fam. VIII. **Alcidae.**—The Sub-order ALCAE contains only this Family, or the Auks, wherein the body is heavy and compact, the head large, the plumage close and elastic. The stout bill varies extraordinarily, as will be seen under the various species. The abbreviated metatarsus is reticulated, usually with a row of scutellae in front; the long anterior toes are fully webbed, the hallux is absent or rudimentary, the claws are stout, acute, and slightly curved. The wings are very short, and the Great Auk was absolutely flightless; but most species fly strongly and rapidly to varying distances, the pinions not being flipper-like as in the Penguins, to which these birds have no affinity; like them, however, they commonly sit upright upon the metatarsus, and walk awkwardly from the feet being placed so far back, while they swim and dive to perfection. The primaries are eleven, the secondaries from fifteen to nineteen. The short tail may be rounded as in *Uria*, or graduated with pointed rectrices as in *Alca;* the quills numbering twelve, except in *A. impennis*, which has eighteen. The furcula is U-shaped, the syrinx tracheo-bronchial, the tongue lanceolate; the nostrils—covered with feathers in *Alca*, *Uria* and *Mergulus*, and with a horny membrane elsewhere—are pervious. An aftershaft is present, and down is plentiful on both adults and nestlings, being in the latter fluffy, and of a black, grey, or brown colour, sometimes relieved by white. Elongated feathers, crests, and horny outgrowths are common, as described below.

Auks are entirely pelagic birds, breeding from the Polar Seas southwards to Japan, Lower California, Maine, and the Berlengas off the Tagus, while wandering further in winter; but the North Pacific may certainly be considered their headquarters. In the case of the British species a small proportion remain near shore after the autumn, but it seems to be quite uncertain where the majority spend the colder months. The members of this Family can hardly be called gregarious, except in the breeding time,

[1] Since referred by Milne-Edwards to the Cypselidae as *Tachyornis*.

when vast flocks arrive with great regularity, or even to an exact day. In England this occurs at the end of March or beginning of April, the latter part of August or the first week of September being as punctually observed for departure. Except for purposes of procreation, or during violent storms, individuals are rarely seen on land, as might be expected from the clumsy style of gait; yet Puffins and Black Guillemots are fairly good walkers, and the former fly particularly straight and swiftly. Auks either splash along the surface of the waves before diving, or plunge suddenly, and when immersed use their wings much as if flying. The usual voice is a harsh-toned croak or grunt, but in addition *Simorhynchus* is said to chatter, *Cyclorhynchus* to whistle; *Ptychorhamphus* utters a musical ringing sound, the Little Auk a wild cry, and Black Guillemots a shrill, plaintive note. Fish, crustaceans, worms, and the like, with chance ship-refuse, compose the diet; the birds frequently disgorging it when scared, and sometimes in order to feed the young.

The great pear-shaped egg of the Guillemots proper, and the more oval one of the Razorbill, is deposited on some bare ledge of a cliff, on a stack, or on an island rock. In the case of the latter bird the egg is usually in a crevice, being white or buff with black or brown markings, and generally, if not invariably, green inside. Guillemots' eggs vary from white or buff to brilliant green or blue, and are spotted, streaked, or covered with intricate wavy patterns of black, brown, or rufous; the same bird probably always producing similar specimens. The Black Guillemots lay two greenish-white eggs with blotches of brown, rust-colour, and grey, under close-packed boulders or in holes low down in cliffs; that of the Little Auk is pale bluish-green, with or without faint rufous stains, and is found in similar, but commonly much higher, situations; *Synthliborhamphus* and various other forms use burrows in the turf, like Petrels, as an alternative to chinks in rocks; but the first-named produces two buff eggs, spotted with brown and grey, while the remainder lay only one, which is either white, or very indistinctly marked. Of these, Puffins fashion a considerable nest of dry materials. In some instances at least, both sexes incubate, the period being nearly five weeks. When hatched in holes the young remain there for a considerable time, otherwise they are soon assisted by their parents to reach the sea. Where unmolested, Auks are sufficiently tame; Puffins,

Razorbills, and so forth, however, bite severely if handled, and the first-named will fight with each other to the death.

As will be seen, the colour of both sexes in summer is black or dusky, varied by white, and occasionally brown; the winter plumage being duller and less decorative, and resembling the garb of the young. The size varies from that of the Great Auk to that of the Least or Knob-billed Auklet, the Family being confined to the Palaearctic and Nearctic Regions.

Lunda cirrata, the Tufted Puffin, ranging from South California to Japan, and straying to Eastern America, is sooty above and greyish below; the sides of the head being white anteriorly, a "rosette" of naked red skin adorning the gape, and a nuptial tuft of long straw-coloured feathers hanging from above each eye. The feet are red, and become flesh-coloured in winter. The highly compressed bill is red in front and yellowish behind; while its base consists of three portions, separated from each other and from the transversely grooved fore-part by furrows, which deepen until the pieces become detached and expose a soft brownish skin, that hardens again towards spring. *Fratercula arctica*, the Puffin, occupies in vast numbers many of the precipitous coasts and islands of Britain, laying its large, dull white, granulated egg—faintly marked with brown and speedily begrimed—in a rock-crevice, or a burrow, often made by the bird itself. The upper parts and gorget are black, the cheeks greyish, the lower surface white, the rosettes yellow, and the feet orange-red. The base of the huge compressed and grooved bill, blue, yellow, and red in colour, is shed in nine pieces towards winter, when the cheeks become white, the rosettes reddish, and a blunt, fleshy, horn-like appendage on the upper eyelid also disappears. This species breeds northwards in the Atlantic, from the Bay of Fundy and the Berlengas off the Tagus, and (as the larger form *F. glacialis*) eastwards to Novaya Zemlya, migrating a little further south: in the Pacific, *F. corniculata*, with longer horns and more developed deciduous bill-sheath, takes its place.

Cerorhyncha monocerata, the Rhinoceros Auklet of the North Pacific and western North America, has a stout, curved orange and black bill, with a large compressed horn between the nostrils, and an accessory piece on the mandible; the upper parts are dusky, the lower whitish with plumbeous cheeks and throat, while a row of narrow white feathers decorates each side of the

head. In winter the horny processes disappear, but not the plumes. *Ptychorhamphus aleuticus*, Cassin's Auklet, of the Pacific coast of North America, is black above and white below, with a lead-coloured throat, a white iris, and a bill which is mainly black, and becomes wrinkled in summer. *Cyclorhynchus psittaculus*, the Parrot Auk of the North Pacific, has an extraordinary compressed orange-red beak, to which the blunt decurved maxilla and narrow up-curved mandible give a rounded appearance; the upper parts and the throat are dusky; the lower surface, the iris, and a row of filaments behind each eye are white, as is the throat in winter. Three species of *Simorhynchus*, from the North Pacific, have a stout orange-red or purplish bill, a white iris, and black upper parts. *S. cristatellus*, the Crested Auklet, has several deciduous plates at the base of the beak, including a round piece at each side of the gape; the lower parts are grey; a tuft of dusky plumes curls over the forehead, and a line of narrow white feathers stretches across the ear-coverts—both being permanent: in winter the bill is horn-coloured. *S. pygmaeus*, the Whiskered Auklet, is without conspicuously deciduous plates, but has an additional patch of white plumes, reaching from the beak above and below the eye at all seasons. *S. pusillus*, the Least Auklet, has on the short maxilla a small compressed basal tubercle, which is shed in winter, but exhibits no crest. The scapular region shews a good deal of white; filamentous white feathers grace the forehead, lores, and ear-coverts; and dusky spots mark the lower parts, in summer only. *Synthliborhamphus antiquus*, of the Pacific north of Vancouver Island and Japan, but accidental elsewhere, has a short, compressed, yellow and black beak, with plumbeous upper and white lower parts; the head and throat are black with a white line on each side of the occiput, the upper back is streaked with white. In winter all the stripes vanish, and the throat is white. *S. wumizusume*, of the Eastern Asiatic seas southward to Japan, has a nuptial crest of long narrow plumes, but no streaks on the back. In the cold season the whole malar region and throat are white. *Brachyrhamphus marmoratus* of the North Pacific, reaching California in winter, has a small slender black bill, dusky upper parts barred with rufous, and white under parts varied with brown; *B. kittlitzi*, of the Aleutian Islands east to Unalashka, Kamtschatka, and North Japan, is thickly

spotted with buff above: *B. hypoleucus* and *B. craveri* of Lower California are plain slate-coloured with white lower surface, the former having white and the latter grey wing-lining. The first two species have a white nuchal collar and irregular white markings above in winter, with nearly white lower parts.

Cepphus grylle, the Black Guillemot of the Atlantic northwards from Britain and Maine, and of the Arctic coasts of Europe, is black with a white wing-patch, the feathers of which are black at the base; in winter the plumage is white, relieved above and sometimes below by black, and the red feet become pinkish. The compressed pointed bill is always black. *C. mandti*, occupying, as it seems, the North Polar seas generally, and breeding as far south as Labrador, has a more slender bill, and no black wing-patch. *C. columba*, ranging from Bering Strait and Japan to California, has a large wedge-shaped black mark on the white wing-patch; *C. carbo*, of North-East Asia, Japan, the Kuril and Bering Islands, shews no white except round the eye. All these forms wander southwards in winter. The Black Guillemot or Tystie still breeds in the Isle of Man, and sparsely on the East of Scotland and Ireland, in the north and west of which countries it is not uncommon. It is remarkably tame when it breeds in the wilder districts, uttering a plaintive cry, and making its way to land in the face of an intruder. The two whitish or greenish eggs, beautifully spotted with black, brown, and grey, are deposited among large boulders, or in holes at the bases of cliffs, without any nest.

Of the last group of Auks, with feathered nostrils, *Uria troile*, the well-known Common Guillemot, Willock, or Murre, breeds numerously in Britain, where the cliffs are suitable; it extends from Bear Island near Spitsbergen to the Magdalen Islands in America and the Tagus in Europe, occurring on migration southwards to the New England States and the Canaries. The plumage is dusky above and white below, with a brownish head and white alar bar. The throat, cheeks, and a few feathers on the head are white in winter; the long pointed bill and feet are blackish. The Ringed Guillemot is a mere variety with a white ring round the eye and a streak behind it; but *U. californica*, with stouter bill, from the Pacific coast of North America, may be considered a sub-species. *U. brünnichi*, distinguishable by its blacker crown, and deeper beak with a white edge to the maxilla,

ranges from the Gulf of St. Lawrence and Iceland to the Arctic Seas of both worlds in summer, moving further south in winter; the North Pacific race being denominated *U. arra*. Descriptions of the colonies of Guillemots in the icy seas, and of the smaller but equally crowded stations in Britain, have been too frequently given to need repetition here; but it may be mentioned that during incubation, which lasts about a month, the parent holds the egg between its thighs, and not unfrequently carries it off

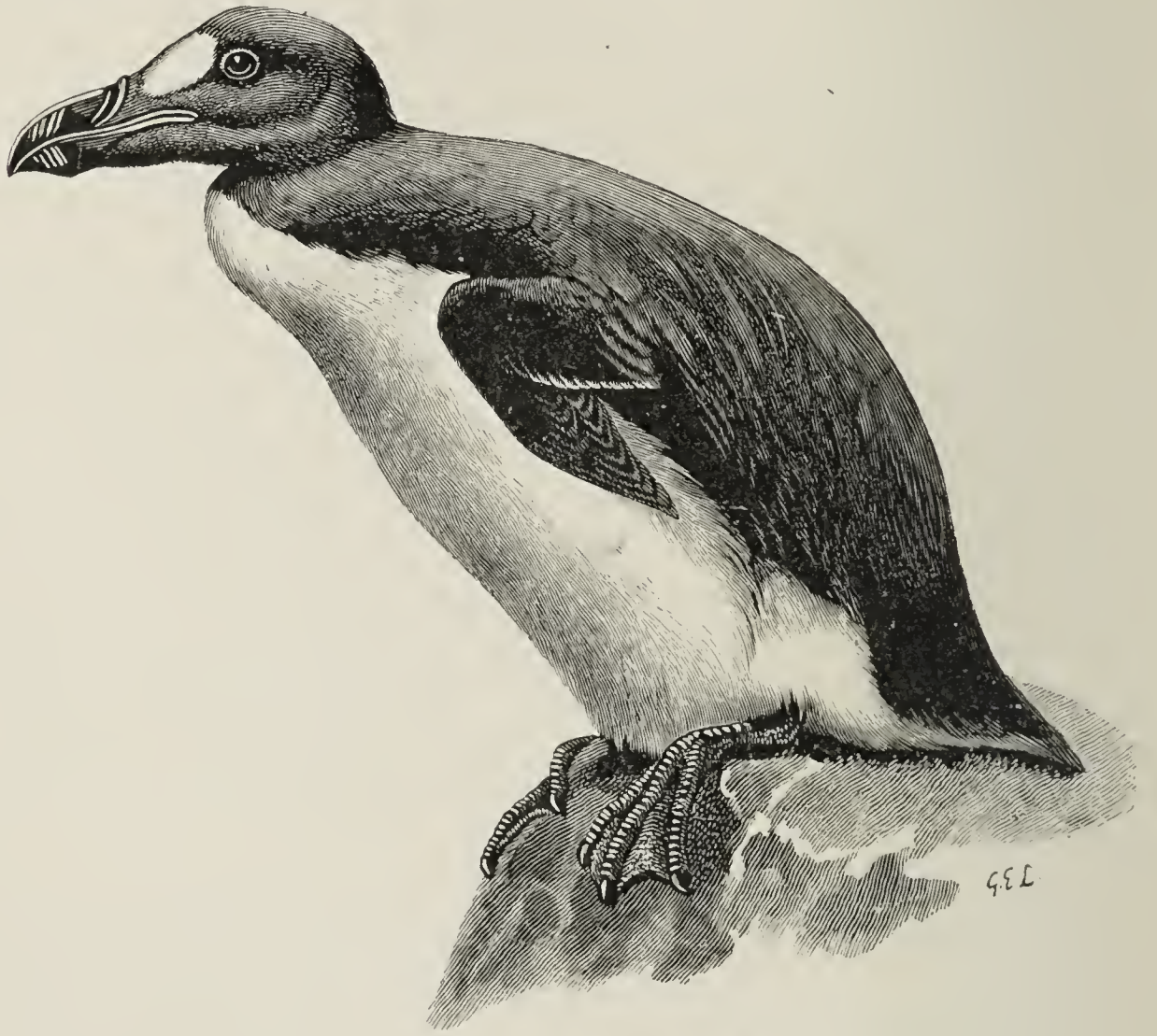

FIG. 64.—Great Auk. *Alca impennis*. $\times \frac{1}{6}$. (After Hancock.)

a ledge, when suddenly scared. On flat-topped stacks these eggs (p. 316) often lie in the closest juxtaposition.

In *Alca* the black bill is deep and highly compressed, with a curved culmen; and shews oblique or transverse grooves, which are wanting in the young. *A. torda*, the Razorbill, less common in Britain than the Guillemot, ranges from Jan Mayen and Greenland to Maine and Brittany, visiting North Carolina and the Canaries in some winters. It is greenish-black with brown throat-region and white lower parts, a white line stretching from the top of the

beak to the eye, and another crossing both mandibles in the adult only. The tips of the secondaries are white, forming an alar bar, the feet are black. The throat and cheeks are white in the winter and immature plumage. *A. impennis*, the extinct Great Auk or Garefowl, inhabited the North Atlantic, chiefly in the neighbourhood of Iceland and Newfoundland, but apparently never reached north of the Arctic Circle. Remains have been found in the kitchen-middens of Denmark, North and West Scotland, and North and South Ireland; in a cave on the coast of Durham; and abundantly on Funk Island in the Newfoundland Seas, where the bird was called "Penguin"; that name being subsequently transferred to the Spheniscidae. The last two living examples were obtained at the isle of Eldey, off Iceland, in 1844, while 1812, 1821, and 1834 are the last dates of capture in Orkney, St. Kilda, and Ireland respectively, allowing for a possible instance in St. Kilda (Borrera) in 1840. This species, extirpated chiefly by the persecution of fishermen, but subsequently by collectors, resembled a flightless Razorbill, though double the size; it had no white stripes on the head or bill, but shewed a large white patch before each eye. The huge egg was white or buff, with scattered round spots or plentiful fine scrawls of black or brown; about seventy of these eggs, and a somewhat greater number of birds, existing at present in collections.[1]

Mergulus alle, the Little Auk or Rotche, occurring on migration in Britain, and occasionally in the Canaries, Azores, and New Jersey, breeds from Greenland and the Kara Sea to North Iceland. It is black above and white below, with a spot over the eye, streaks on the scapulars, and an alar bar also of white; the throat is black in summer only. The short, broad, arched bill is black, the feet are brownish. The single greenish- or bluish-white egg, often shewing faint rufous markings, is deposited in a deep crevice of a cliff, or among boulders on beaches.

As regards fossil forms, *Uria* has been found in the Miocene of Maine and North Carolina, and in the Pliocene of Tuscany.

Of the second or Pteroclo-Columbine group of Charadriiform Birds (p. 268) the Old World Sub-Order PTEROCLES contains only—

Fam. IX. **Pteroclidae**, or the Sand-Grouse, equally interesting as regards their structure and their habits. Originally considered

[1] For the literature, see A. Newton, *Dict. Birds*, 1893, pp. 220-221, 303-308.

akin to Grouse, they have since given rise to much discussion; Dr. Gadow's view—here adopted—being that they are highly specialized forms, analogous to the Galli in their digestive organs, but homologically constituting a link between the Limicolae and the Columbae.[1] From the Pigeons they certainly differ remarkably in the condition of the chicks, which are covered with brown, creamy, and black down, and run almost immediately from the shell; yet they agree with them in most points of osteology, myology, and pterylosis, while the eggs recall those of Rails, and the flight resembles that of a Plover.

The body is compact; the bill short, arched, and fairly stout; the metatarsus abbreviated and feathered anteriorly, or entirely in *Syrrhaptes*. In this genus, moreover, the hallux, much reduced elsewhere, is totally absent; and the short front toes are enclosed in a sort of casing, which is covered as far as the thick claws with hairy plumage, the whole forming a padded foot unique among Birds. The long pointed wings have sixteen or seventeen secondaries, and eleven primaries, of which the outer has its shaft produced into a thin filament in *Syrrhaptes paradoxus;* the wedge-shaped tail has sixteen rectrices, the median pair being elongated and pointed in that genus and *Pteroclurus* (Pin-tailed Sand-Grouse), if the latter be allowed to stand. The furcula is U-shaped, the syrinx tracheo-bronchial, the tongue lanceolate; there is a small aftershaft, and a large crop; while the down of the adults is sparingly distributed.

Sand-Grouse are true desert-birds, affording excellent instances of protective coloration in their buff or brownish tints, slightly varied with grey, black, orange, and white; *Pterocles fasciatus* and *P. lichtensteini*, however, prefer bushy and rocky ground to bare, sandy, or stony plains. Gregarious yet monogamous, they are shy and wary, but very pugnacious among themselves; their flight is swift, strong, and noisy; their powers of walking and running good, though rather clumsy, owing to the extremely short legs. All the species lie closely until flushed, and are fond of basking in the sun on their sides, in holes scraped out for the purpose. Migration probably prevails to some extent throughout the Family, while the irruptions of *Syrrhaptes paradoxus* into Europe (p. 324) are quite unparalleled. The cry, often uttered upon the wing, is a piercing whistle, or a twittering

[1] *P.Z.S.* 1882, pp. 312-332; Bronn's *Thier-Reich*, *Aves*, *Syst. Theil*, pp. 207-209.

or clucking sound; though that of *Syrrhaptes* appears to be hoarser, and has been syllabled as "truck-turuck" and "caga-caga" in *S. paradoxus* and *S. tibetanus* respectively. The alarm-note is of a croaking nature. The food consists of seeds, tender shoots, bulbous grass-roots, and insects, or even of berries, peas, and beans; while the birds flock to drink at certain favourite spots, and are variously stated to take continuous or interrupted draughts. The nest is a mere hollow in the soil, frequently lined with a little grass; the three oval, but peculiarly cylindrical, eggs vary from whitish to buff, or greenish in *Syrrhaptes*, and are marked with brown, reddish, and violet. Both sexes assist in incubation, which lasts from twenty-five to twenty-eight days. Opinions vary as to the edible quality of the flesh.

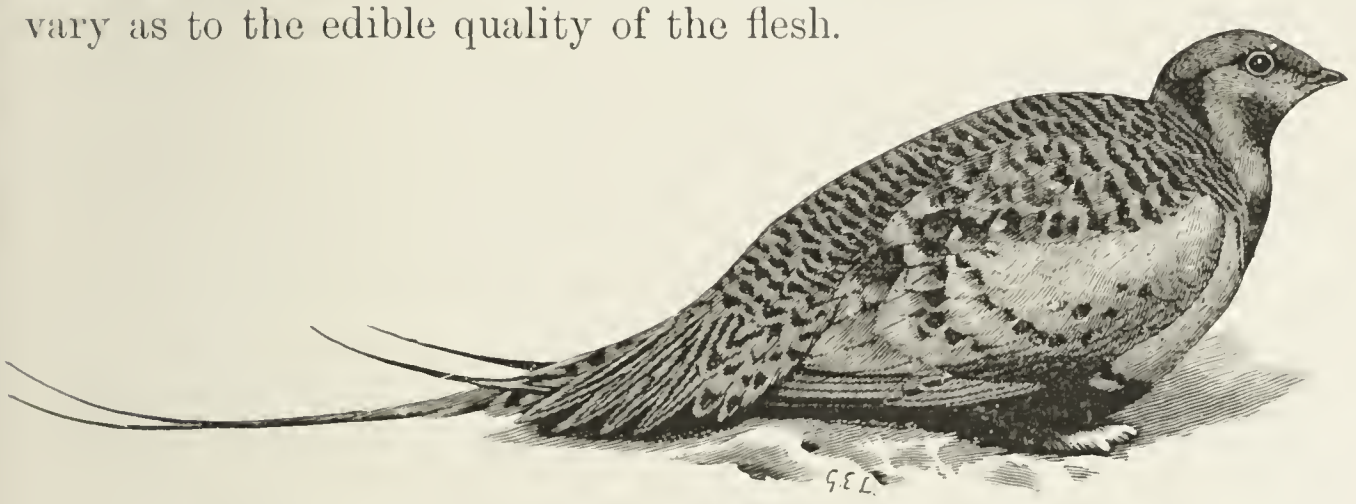

FIG. 65.—Pallas's Sand-Grouse. *Syrrhaptes paradoxus*. × $\frac{3}{10}$.

Pterocles arenarius, ranging from the Canary Islands, North Africa, and Madagascar to South Europe and Central Asia, has dark grey upper parts, with orange-yellow markings, except on the white-tipped primaries and tail; the chestnut throat surmounts a black patch, which is succeeded by a breast of the same dove-colour as the head, crossed by a black band; the belly being black also. The bill is horn-coloured, the feet are greyish. The female is buff, barred above and spotted below with black; her throat is yellowish-white, and the black areas on her lower surface are as in the male. *P. decoratus* of East Africa, *P. bicinctus* and *P. variegatus* of South Africa, *P. coronatus* and *P. lichtensteini*, extending from the Sahara and Kordofan respectively to North-West India, *P. gutturalis* of East Africa, *P. personatus* of Madagascar, *P. fasciatus* of India—the only species peculiar to Asia—and *P. quadricinctus*, found from Senegambia to Abyssinia, are fairly similar to the above, though chiefly sandy in some cases.

Pteroclurus alchata, absurdly termed "Perdrix d'Angleterre"

in France, and Rock-Pigeon in India, is grey above, with yellow tips to the dorsal feathers; it has black, brown, and greyish-white wings, shewing chestnut and yellow on the coverts; yellowish rump and long median rectrices barred with black. The cheeks are orange, the throat is black with a little yellow beneath, the upper breast is chestnut-red, bordered by a black line above and below, the remaining under parts are white, the bill and feet brownish. The female differs in her white throat, and in her upper surface irregularly marked with buff, grey, and black. This species occurs in South Europe, North Africa, and South-West Asia; *P. namaqua* inhabits South Africa; *P. exustus* ranges from Senegal to the Pangani River in East Africa, and through Palestine to Central Asia and India; while *P. senegallus* extends from the Sahara to Palestine, Arabia, and North-West India.

Syrrhaptes paradoxus, Pallas's Sand-Grouse, has buff upper parts barred with black; mainly blue-grey wings and tail, with black and chestnut markings on the former, and white tips to the lateral rectrices; dull yellow crown and cheeks; orange nape and throat; greyish-buff neck and breast, white abdomen and metatarsal plumage, an interrupted black gorget, and a broader black band towards the belly. The female has less elongated median tail-feathers, black streaks on the buff head, a black bar across the throat, and is duller generally. *S. tibetanus*, with entirely white belly, the largest of the Family, extends from the Sutlej and South Kashmir to Koko-Nor; but its congener reaches from the Lower Volga or the Kirghiz Steppes to the north of Lake Baikal and North China, while some erratic impulse of uncertain origin causes it to invade the plains of China and the whole of Europe at irregular intervals. One specimen was obtained at Sarepta on the Volga in 1848, and again in 1860, when flocks visited Pekin; in 1859 a few examples occurred on the Continent, and between July and November three wandered to Britain; while in 1863 some 700 individuals reached our shores by May 21, straying as far as Ireland, but vanishing towards autumn. Several pairs bred on the sand-hills of Holland and Jutland. In 1872 and 1876 small parties visited us; and in 1888 another and incalculably larger invasion took place, which extended farther southward than that of 1863, and after entering Europe before the beginning of April, occupied Britain between May 6 and May 15, to remain there throughout

that year and the succeeding. Besides breeding in Denmark, Holstein, and no doubt elsewhere on the Continent, two pairs nested in 1888 in the east of Yorkshire, and one or more on the Culbin Sands in Moray, whence in 1889 Professor Newton received on August 8 a chick of two or three days old. This was exhibited at the Newcastle Meeting of the British Association, and subsequently figured in *The Ibis*.[1] Doubtless the above were not the only cases of reproduction in England, and it was hoped that a protective Act, which came into force in February 1889, would lead to permanent colonization; but by 1890, or, according to some, 1892, all the birds had disappeared.

As a fossil, *Pterocles* occurs in the Eocene and Miocene of France.

The Sub-Order COLUMBAE must certainly be divided into the Families *Didida*e for the Dodo and Solitaire, and *Columbidae* for the Pigeons, while a third, *Didunculidae*, may be added to contain the Tooth-billed Pigeon of Samoa, to which *Otidiphaps* of Papuasia is possibly allied. For convenience sake we may accept four Sub-families of the *Columbidae*, namely (1) *Gourinae*, (2) *Peristerinae*, (3) *Columbinae*, and (4) *Treroninae*, though the arrangement is somewhat arbitrary. Dr. Gadow[2] segregates *Caloenatinae*, but not *Peristerinae*, while he and Count Salvadori[3] agree in considering *Didunculus* merely on a level with these subdivisions.

Throughout the group the body is compact, while the bill varies from stout to slender, being swollen and hardened at the decurved tip, which forms a hook in the Didida and Didunculidae. The base of this feature is covered with a soft skin or cere, containing the nostrils; *Globicera*, *Vinago calva*, and *Ptilopus insolitus* have a fleshy or bony knob at the posterior part of the culmen, said to be most prominent in the breeding season; and *Didunculus* has the mandible toothed and truncated. The metatarsi, reticulated in the Gourinae, but scutellated elsewhere, are usually partly feathered, especially in Fruit-Pigeons; some species of *Columbigallina*, however, have them naked; *Drepanoptila* has them entirely covered; and in many domestic breeds the plumage extends over the toes, which are all on the same level, and possess moderate claws. The skin is more or less expanded

[1] For further details see A. Newton, *Ibis*, 1864, pp. 185-222; 1890, pp. 207-214; *Dict. Birds*, 1894, pp. 805-810; cf. also *Zool. Rec.* 1888-89.

[2] Bronn's *Thier-Reich*, *Aves*, *Syst. Theil*, 1893, p. 210.

[3] *Cat. Birds Brit. Mus.* xxi. 1893, p. 3.

on each side of the digits. The rounded wings are commonly long, but are short in Ground-Pigeons, and aborted in the flightless Didiidae, the primaries numbering eleven and the secondaries from ten to seventeen; the former are bifurcated at the tip in *Drepanoptila,* attenuated in some members of *Ptilopus, Oxypelia, Peristera,* and *Leptoptila,* while one or more of the three outer feathers is not uncommonly scalloped. The tail varies considerably in form and dimensions, being wedge-shaped in *Sphenocercus,* rounded in *Zenaida, Phabotreron,* and *Megaloprepia,* acuminate in *Ectopistes,* long and graduated in *Oena, Macropygia,* and *Reinwardtoenas,* and so forth. The rectrices range from twelve to twenty, sixteen being the normal number in the Gourinae, twelve in the Columbinae, and fourteen in the Treroninae. The neck-feathers may be bifurcated, as in *Alectroenas, Columba guinea,* and occasionally in *Turtur,* or those of the breast, as in some species of *Macropygia, Ptilopus,* and *Phaenorrhina;* the neck, moreover, is hackled in *Caloenas* and *Lopholaemus,* and the body-plumage is generally narrow with widely-separated barbs in *Chrysoenas.* Five members of *Phlogoenas* have a patch of stiff feathers over the crop; while the splendid decomposed crest of *Goura* is exceptionally striking, and more ordinary tufts grace the head in *Lopholaemus, Coryphoenas, Lophophaps, Oeyphaps,* and elsewhere. The forehead is sometimes nearly bare, as are the lores and eyelids in *Gymnophaps;* naked red or yellow orbits are found in *Gymnopelia, Reinwardtoenas, Macropygia, Turacoena, Didunculus,* and *Columba gymnophthalma,* not to mention other instances; while the tendency reaches its height in the huge circumocular wattles of several fanciers' races. In *Serresius* a feathered "saddle" extends over half the culmen.

The furcula is U-shaped, being much reduced in the Didiidae; the syrinx is remarkable for the asymmetrical union of the sterno-tracheal muscles; the tongue is lanceolate; the impervious nostrils are linear in the Columbidae and Didunculidae, oblique in the Didiidae. The crop is more highly developed than in other Families. The gizzard of *Caloenas* is remarkable for an indurated horn-like patch on each side of the epithelial lining, that of *Carpophaga latrans* has the interior beset with similar conical prominences, correlated with a diet of hard fruit. *Phaenorrhina* has these cones still more developed, and *Ptilopus* agrees with *Drepanoptila* in possessing four pads in the above organ instead

of two, the regular number in Birds. The after-shaft is rudimentary or absent, the adults have no down, the young are hatched blind and naked, and remain for a long time in the nest. The plumage is commonly dull blue or brown, with an iridescent sheen; but remarkably brilliant purple, red, yellow, and green hues manifest themselves in forms such as *Ptilopus, Chrysoenas,* and *Caloenas* from the islands of the Eastern Seas, the headquarters of the Family. Though smaller, the female usually resembles the male: but *Turturoena, Oena,* and *Peristera* are examples of diversity, while immature examples are duller than adults. *Goura* approaches the size of a goose, whereas *Columbigallina* is little larger than a sparrow. Of domestic Pigeons the Rock-Dove is undoubtedly the origin, but the breeds are now infinite in their variety.[1]

Omitting the abnormal Didine Birds, the habits of the members of this group are fairly uniform, the majority of them inhabiting wooded country; while even those like *Phaps, Lophophaps,* and *Geophaps,* which occupy the arid plains of Australia, are to be found at times where vegetation is plentiful; and in all cases the proximity of water seems indispensable. Fruit-Pigeons frequent trees, and the most typical Columbine forms are found in woods or among rocks, though the smaller Doves naturally prefer the lower bushes. Wood-Pigeons towards winter, and Passenger-Pigeons when nesting—not to mention other instances—gather in large flocks; in some cases, however, the parties only number about half a dozen, and more solitary habits are by no means uncommon. The flight is strong, rapid, and direct, though the Ground-Pigeons remain a comparatively short time upon the wing, and some species prefer to run unless forced to rise, *Oena* being an especially good walker. The well-known "homing" powers of trained birds, the curious backward somersaults of the Tumbler, and the sudden rise and clap of the wings so noticeable in the Wood-Pigeon when courting, merit a passing mention. Every member of the Family perches, and many delight to bask in the sun. The note is always of the nature of a coo, but is especially loud and deep in *Myristicivora, Megaloprepia,* and some members of *Carpophaga,* guttural in *Haplopelia,* mournful in *Peristera* and *Zenaidura,* harsh and trumpet-like in *Goura;* the voice of the Turtle-Dove suggests a purr, while *Tympanistria* and *Starnoenas* possess powers of ven-

[1] See Darwin, *The Variation of Animals and Plants under Domestication*, i. London, 1868, pp. 131-224; Tegetmeier, *Pigeons, their Structure, etc.* London: 1867.

triloquism. The food of the Wood-Pigeon is grain, beech-mast, acorns, turnips, and tender shoots of plants; that of Fruit-Pigeons consists of figs, palm-nuts, grapes, and so forth, plucked from the tree, and in the case of *Myristicivora bicolor* and *Globicera myristicivora*, largely of the mace which encases the nutmeg; Ground-Doves and other small forms subsist mainly on seeds of grasses; and it may be safely inferred that in most cases the diet varies considerably. *Turturoena* is stated to eat Cicada larvae; *Leucosarcia* those of Diptera; *Goura* and *Otidiphaps* worms, snails, and insects. Pigeons, unlike birds generally, take continuous draughts of water, immersing the bill to the base. The nest is usually a slight platform of sticks, placed aloft on a branch or in a bush; but our Rock-Dove and *Columba phaeonota* of South Africa breed in caves or holes in rocks; the Stock-Dove prefers hollow trees, rabbit-burrows, and the like; *Geophaps* the bare soil; and so forth. *Phaps*, *Peristera*, and *Zenaida* nest either on the ground or in bushes, but the latter appear to be almost invariably chosen by Ground-Doves like *Columbigallina* and *Gcopelia*. The white eggs are two, or exceptionally three, in number; the Dodo, however, laid only one, and so do *Caloenas*, *Ectopistes*, *Didunculus*, and some species of *Carpophaga* and *Columba*, as well as *Goura*, where it is larger than that of a tame Duck. Societies, such as those of *Ectopistes* and *Calocnas*, are most unusual. Some Pigeons breed three times a year, the male commonly assisting in incubation, which lasts from fourteen to twenty-eight days. The members of this Family are shy, but readily tamed; yet the Collared Turtle-Dove is perhaps the only really good cage-bird. Most of them are excellent for the table, *Leucosarcia*, *Geophaps*, *Goura*, and the Treroninae being accounted particularly delicate, while the Wood-Pigeon and the domestic breeds speak for themselves. The great damage, however, done to crops, such as turnips, peas, or barley, by the flocks counterbalances their economic value to a considerable extent, the most typical forms being undoubtedly the worst offenders.

Fam. X. **Dididae.**—This consists of three extinct species—*Didus ineptus*, the Dodo of Mauritius, *D. borbonicus* of Réunion (Bourbon), and *Pezophaps solitarius*, the Solitaire of Rodriguez.

The Dodo, familiar to all by name, if not by pictures, was an immense Pigeon-like bird bigger than a Turkey, with an aborted keel to the sternum and the wings also aborted. The coracoid and scapula met at an obtuse angle, as in many other flightless species.

The huge blackish bill terminated in a large horny hook, the cheeks were partly bare, the short yellow legs were stout, scaly, and feathered on the upper portion; the plumage was dark ash-coloured, with whitish breast and tail, yellowish-white wings, and black tips to their coverts. The short rectrices formed a curled tuft, and the first four primaries were directed backwards.

This uncouth and unwieldy species, of which a full account will be found in the works mentioned below,[1] which have been largely utilized here, was noticed as early as 1598 by the Dutch,

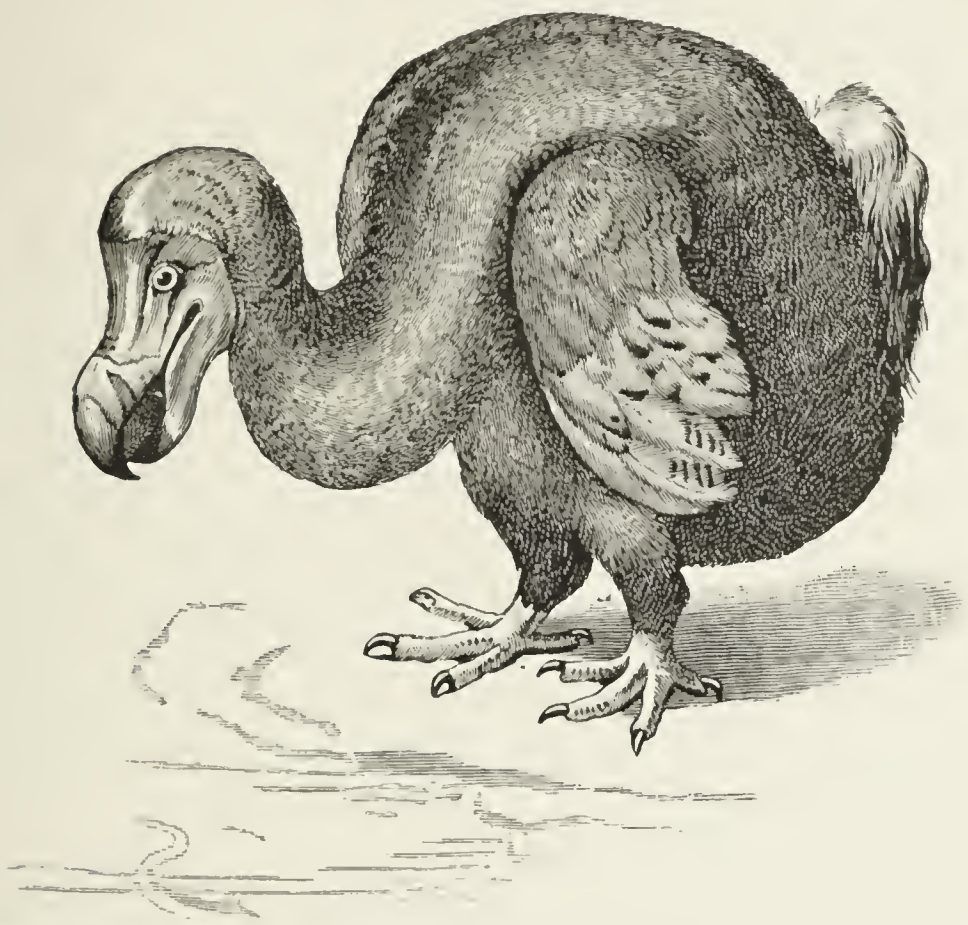

FIG. 66.—Dodo. *Didus ineptus.* (After Savery's Vienna picture.)

who called it Walghvogel, or Nauseous Bird, from their dislike of its flesh, and the island, where it was then found abundantly, Mauritius. The earliest representation was given in 1601 by De Bry, who stated that an example was brought alive to Holland. Other Dutch fleets subsequently visited the island, and several sketches of the Dodo were made, while one of the captains records that it was indifferently called Dodaars or Dronte. Roelandt Savery of Courtrai (1576-1639) painted the Dodo—probably from life—more than once, pictures by him still existing in

[1] Strickland and Melville, *The Dodo and its Kindred*, London, 1848; A. Newton, *Dict. Birds*, 1893, pp. 155-161, 215, 216; E. Newton and H. Gadow, *Tr. Zool. Soc. London*, xiii. 1893, pp. 281-302.

Berlin (1626), Vienna (1628), the Hague, Pommersfelden, Stuttgart, and London, the last-named belonging to the Zoological Society. The British Museum also possesses an undated picture, another is at Haarlem, a third at Oxford; while one by Goiemare at Sion House (dated 1627), and one said to be by Hoefnagel in the library of the late Emperor of Austria (*circa* 1620) were possibly taken from living birds. In 1628 Englishmen appeared on the scene, Emanuel Altham having sent a specimen home alive to his brother, while Herbert, accompanying the same fleet, mentioned the Dodo and figured it. About 1634 an example was given to the Anatomy School at Oxford by a Mr. Gosling, and some four years later Sir Hamon Lestrange saw a captive bird in London. Finally, we may note that individuals existed in Mauritius until 1681, as proved by the journal of Benjamin Harry.

In 1865 the discovery of a large quantity of remains in the Mare aux Songes, by Mr. G. Clark, enabled Owen and others to confirm the suggestion of the Danish naturalist, Reinhardt, of the Dodo's affinity to the Pigeons; while in 1889 M. Sauzier, acting for the Government of Mauritius, sent to the late Sir Edward Newton a series of bones from the same spot, enabling the first correctly restored and properly mounted skeleton to be returned for the museum of that island, and the important paper, noticed above, to be published by the last-named and Dr. Gadow. Nearly perfect specimens exist at Cambridge, in the British Museum, and at Paris.

The Dodo is said to have inhabited forests, to have swallowed pebbles, to have uttered a cry like that of a gosling, and to have laid one large white egg on a mass of grass. Hogs and other imported animals seem to have conduced to its extermination, as well as the hand of man.

Didus borbonicus had white plumage, varied with yellow, the first four primaries being directed forwards and downwards. It is mentioned by Tatton (1625), Du Bois (1669), and Carré (1699); while Bontekoe (1646) gave a figure apparently intended to represent it, and another by Pierre Witthoos (*ob.* 1693) was in existence a few years ago. It was originally called the Solitaire, but this name was also applied to *Pezophaps solitarius* of Rodriguez by the Huguenot exile Leguat, who described and figured the latter about 1691. *Pezophaps* was subsequently briefly noticed by D'Heguerty (1751) and again by Pingré (1761), who heard

that it still existed in inaccessible districts; while it is also mentioned in an anonymous manuscript discovered at Paris, written perhaps about 1729. Remains came into the hands of Desjardins in 1789 (not fully recognised until 1832), and others were forwarded to England; but much the most important finds were those of the late Sir Edward Newton in 1864, followed up by Mr. Jenner in the succeeding years, and of Mr. H. H. Slater in 1874.[1] In 1875 two complete skeletons were obtained, and fairly perfect specimens of those of each sex are at Cambridge, with others elsewhere.

This Solitaire was larger than a Swan, the male standing about 2 feet 9 inches, and the female 2 feet 3 inches high; the colour of the former was brownish-grey, but the latter varied from the hue of "fair hair" to brown, and had a whitish breast. The slightly-hooked, elongated beak had a feathered ridge or peak at the base of the culmen, the neck was elongated and straight, the legs were longer and weaker than in the Dodo, the wings were rudimentary, the hind part (pelvis) was rounded, the tail was hardly noticeable, and the thigh-feathers were thick, and curved "like shells" at the end. A spherical mass of bone, "as big as a musket-ball," was developed on the wings of the males; and they used it, in addition to the beak, as a weapon of offence, while they whirled themselves about twenty or thirty times in four or five minutes, making a noise with their pinions like a rattle. The mien was fine and the walk stately, the birds being seen singly or in pairs; the nest was a heap of palm-leaves a foot or more high, the single large egg was incubated by both parents. The food is said to have consisted of seeds and leaves, and a stone as big as a hen's egg was often found in the stomach.

Fam. XI. **Didunculidae.**—*Didunculus strigirostris*, the Manumeà or Red Bird of the islands of Upolu, Savai, and Tutuila in the Samoan group, is glossy greenish-black, with chestnut back, rump, wing-coverts, tail and under tail-coverts, but browner wing-quills and abdomen. The hooked and toothed bill is orange, the feet are reddish, and the naked orbits red. The sexes are similar, the young entirely brown. First made known by Strickland on the strength of its discovery in the autumn of 1839 by Peale

[1] *Phil. Trans.* clix. 1869, pp. 327-362; clxviii. 1879, pp. 448-451. Further details will be found in Strickland and Melville's work *The Dodo and its Kindred*. London, 1848, pp. 46-56; A. Newton, *Dict. Birds*, 1896, pp. 887-892.

during the United States Exploring Expedition under Commander Wilkes, it has since been met with by several travellers and missionaries, three living specimens having been exhibited in the Gardens of the Zoological Society of London. By 1863 it was regarded as nearly extinct on Upolu, where it was formerly abundant, though it still held its own on Savai; but in 1874 an increase was reported from the latter island, which was attributed to a change of habits, the birds having become arboreal instead of terrestrial.

The oldest accounts, derived from native sources, stated that *Didunculus* was essentially a ground species, living on thickly-

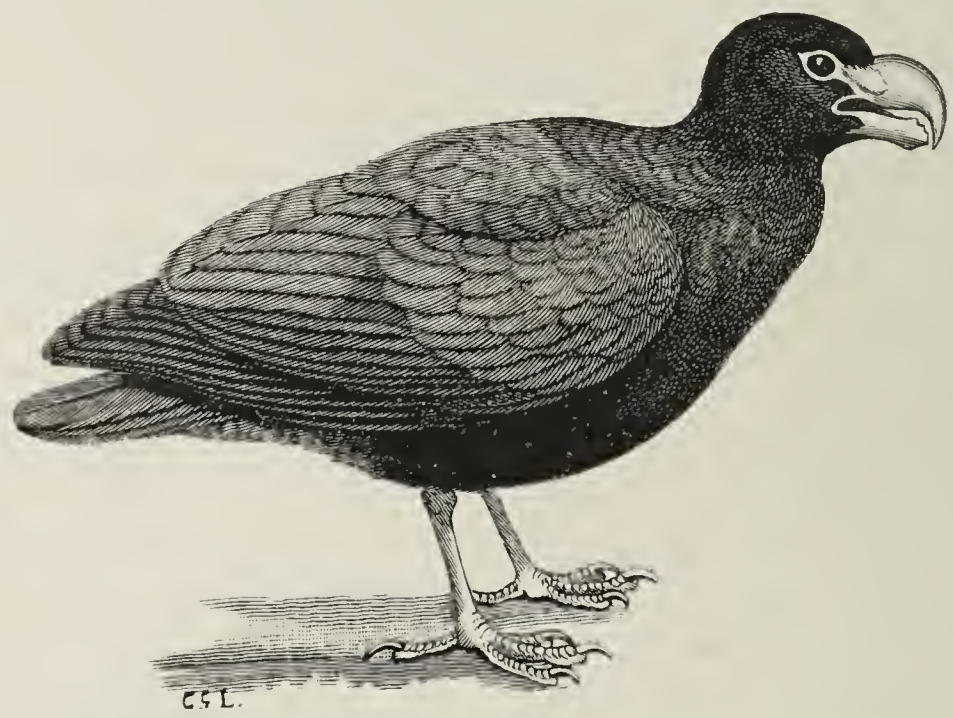

FIG. 67.—Manu-meà or Tooth-billed Pigeon. *Didunculus strigirostris.* × ¼.

wooded mountain-sides in flocks of about a dozen, and feeding on berries, plantains (bananas), and yam fruit, while it roosted on low stumps, and bred on the ground, being rather shy, and taking to flight noisily with much flapping of the wings. Mr. Whitmee[1] and others, however, tell us that it now feeds almost exclusively on high trees, roosting aloft, and building in the forks. But as early as 1852 Lieutenant Walpole[2] asserted that the bird bred among rocks, perched and fed on trees, and flew from wood to wood, or even from island to island, so that it is not impossible that its supposed affinity to the Dodo led writers astray, and that its fondness for the ground was greatly exaggerated. No doubt danger from introduced cats and rats would force the nest to be placed higher.

[1] *P.Z.S.* 1874, pp. 183, 184.

[2] *Op. cit.* 1852, p. 87.

The Tooth-billed Pigeon was usually found in pairs or small parties, and was in great request for food among the natives, who, moreover, kept individuals tethered to sticks as pets, while the chiefs erected small huts in which to feed the flocks. They were often attracted by decoys, and caught with bird-lime. The habits are diurnal, or somewhat crepuscular; the note apparently varies from deep and guttural to low and plaintive; and breeding takes place from May to September, the single egg being white. The birds are decidedly pugnacious in captivity, and occasionally nibble their food in Parrot fashion.

Fam. XII. **Columbidae.**—If we omit the Arctic and Antarctic

Fig. 68.—Crowned Pigeon. *Goura coronata.* × $\frac{1}{5}$.

countries, this group forms a remarkably cosmopolitan Family, though with an irregular distribution. Roughly speaking, there are recognised some dozen Palaearctic, and still fewer Nearctic species, with about seventy Neotropical and forty Ethiopian; India possesses about thirty, the Malay Archipelago perhaps a hundred and twenty, New Guinea and the Moluccas a hundred. Many island forms occur in Polynesia, but Australia can barely claim twenty, the New Zealand seas only furnish two, and the Sandwich Islands none.

Sub-fam. 1. *Gourinae.*—This contains seven species of *Goura* —*G. coronata* of Western New Guinea, Waigiou, Batanta, Salawatti, and Mysol, *G. cinerea* of the Arfak Mountains, *G. sclateri* of Central and Southern New Guinea, *G. albertisi* of South-East New Guinea, *G. scheepmakeri*, probably from South-West New Guinea—all of which have the erect crest-feathers with entirely decomposed webs—*G. victoria* of Jobi and Mysori, and *G. beccarii* of Central and North New Guinea—which have them with spatulate tips. The first of these, discovered by Dampier in 1699, is bluish-slate-coloured, with darker wings, and some black on the chin and sides of the head; a broad chestnut band crossing the back, one of white shewing conspicuously on the wing, and one of grey terminating the tail. The other species differ in the amount of chestnut above, the wing-bar being grey and the breast chestnut in some cases. These birds are found near open or cultivated lands, ranging from the coast regions to an altitude of a thousand feet; they feed in small flocks, and eat seeds, berries, and other fruits, buds of plants, worms, and insects. The usual note is long, harsh, and trumpet-like, the love-call a short mournful coo. When disturbed they take to cover, and pitch upon low branches, where they also roost; in the heat of the day they lie in the shade with outspread wings and tail; and in the courting-season the cocks fight savagely for the hens. The nest, a careless platform of sticks, contains one large white egg.

Sub-fam. 2. *Peristerinae.*—This ranges over both the Old and the New World, *Zenaida*, *Peristera*, and their closest allies being confined to the latter, while *Turtur*, *Phaps*, and so forth belong to the former.

Group (*a*).—*Caloenas nicobarica*, which extends from the Nicobar Islands through the Malay Archipelago to the Solomons, is a metallic-green bird, with bronzy reflexions and blackish head, neck, and upper breast, most of the remiges being black, and the tail with its coverts white. The long narrow neck-hackles, the roughly-scaled legs, and the black knob at the base of the bill are also remarkable features. Partly but not entirely terrestrial, it walks at a great rate, feeds mainly upon the ground on seeds, utters a croaking note, often builds in societies on trees, and lays one white egg. *C. pelewensis*, of the Pelew Islands, is smaller and bluer.

Group (*b*).—This section of the Sub-family contains several robust forms, with fairly long, stout legs, and short, rounded wings.

Otidiphaps nobilis of Western New Guinea and Batanta, *O. cervicalis* of South-East New Guinea, and *O. insularis* of Fergusson Island, are greenish-black, chestnut, and purple, with the bill red, the feet reddish with rough yellow scales, and the nape green, grey, and black respectively. They have no less than twenty rectrices, while the first two have an occipital crest. These Pigeons, said to resemble Megapodes in habits, frequent hills or dense thickets, often near the sea-coast, but are difficult of observation, owing to their shyness; they run swiftly with erect outspread tail, perch on low boughs, and have a harsh cry, varied by a plaintive note; the food consists of fruits, roots, and snails. The nest, containing one egg, is said to be placed at the foot of a tree. *Starnoenas cyanocephala*, of Cuba and the Florida Keys, is brown above and purplish-rufous below, with a blue crown surrounded by black, a black throat with a white basal line, a white stripe across each cheek, and red bill and feet varied with bluish. This bird, the "Perdiz" of the Cubans, frequents wooded hills and has somewhat gallinaceous habits; the food consists of seeds, berries, and snails, the hollow note having the effect of ventriloquism. Another long-legged, terrestrial genus from New Guinea is *Eutrygon*; *E. terrestris* being olivaceous lead-coloured, with rufous outer margins to the brown remiges, while *E. leucoparcia* has a reddish hue on the wing-coverts. *Leucosarcia picata*, the white-fleshed Wonga-wonga of Eastern Australia, is blue-black with white forehead, pectoral band, and central abdomen. It inhabits the brushes, and feeds chiefly upon the ground on seeds, fruits, and insect-larvae; the flight is of short duration and the habits somewhat Pheasant-like; the nest is in a tree. *Phlogoenas* contains a score of members ranging from the Philippines and Timor to the Society Islands. *P. luzonica* of Luzon has purplish upper parts, a greyish-blue head, and yellowish-white lower parts, with a patch of stiff red decomposed feathers over the crop; the inner webs of the remiges are more or less rufous, a characteristic found also in *Chalcopelia*, *Columbigallina*, *Scardafella*, and *Leptoptila*, from very different parts of the world. *P. rufigula*, of New Guinea and the islands to the northwest, has the crop-patch yellowish-ochre; *P. tristigma* of North Celebes is perhaps most striking of all, with its yellow breast and forehead, green head, purple nape, and green and purple tints on the brown upper back; *P. stairi* of the Fiji and Tonga

Islands has a greenish-grey head and brownish upper surface, with brilliant violet-purple on the wings and a vinous breast, while the female differs in being olive-brown, with the head and breast dull cinnamon. *P. kubaryi* of the Caroline group is almost entirely violet-purple above, the head being grey, the forehead, sides of the neck, throat, and breast white. *Geotrygon* with some dozen and a half species extends from South Mexico to Paraguay, several of them being peculiar to the West Indies. *G. montana*, the "Mountain-Partridge," ranges from Key West and Cuba to Paraguay. It has a purplish-rufous upper surface, while the lower parts are whitish-fawn colour, with a purplish breast. The female is olive with a tinge of gold above, and chiefly buff below, with browner breast. *G. chrysia* of Haiti, Cuba, the Bahamas, and the Florida Keys has reddish-brown upper parts, with reflexions of brilliant purple, green, and gold, and vinaceous-white lower parts. *G. violacea* of Central America and Brazil, *G. cristata*, the "Mountain-Witch," of Jamaica, *G. linearis* of Colombia, and other species, bear a general resemblance to the above. These birds frequent thickly-wooded districts or mountainous tracts, where they feed upon the ground on seeds, fallen berries, snails, and slugs. They often have recourse to running, yet the flight is rapid and whirring; the note is a moaning coo, the nest a slight structure on bushes, trees, or even the ground. *Osculatia purpurea* and *O. sapphirina* are two beautiful Ecuadorian Pigeons, of which the former has a rich purple crown and occiput, a purplish-violet mantle with duller wings, a violet rump, a bronzy-green hind-neck, a white forehead, throat, and abdomen, a greyish breast, and white cheeks with a black transverse stripe below. The latter has the crown grey, the occiput golden-green. *Leptoptila* (*Engyptila* of some authors), distributed from Texas to Argentina, contains about seventeen somewhat similar forms, which have olive-brown upper parts, with red, green, and dove-coloured reflexions, and usually pinkish-white or greyish under parts. The wing-quills almost invariably shew some cinnamon on their inner webs, while in *L. rufinucha* the region of the nape is rufous. The White-bellied Pigeon of Jamaica (*L. jamaicensis*) is an unsuspicious bird which habitually lives on the ground in woods, eats seeds and fruits, runs, walks, or flies for short distances, and sometimes uses straw instead of sticks for its nest. The genus *Haplopelia* is restricted to the Ethiopian

Region, *H. larvata* of South Africa, *H. bronzina* of Abyssinia and Shoa, *H. principalis* of Prince's Island, *H. simplex* of St. Thomas, *H. johnstoni* of Nyassa-Land, and *H. inornata* of the Cameroons, being all much alike. The first-mentioned—common in woods near Cape Town—is plain brown, with green and purple gloss on the crown and nape, a white forehead and throat, and vinaceous breast with coppery reflexions. It is the Cinnamon or Lemon Dove of the colonists, and feeds chiefly on berries, obtained upon the ground.

Group (*e*).—The third section of the Peristerinae is confined to the Old World, and shews metallic blue or green wing-spots or patches. *Ocyphaps lophotes*, the swift Crested Bronze-wing of the interior of Australia, is found in flocks, especially near water, and has a remarkable habit, when alighting, of erecting its long, black crest and elevating its tail until they almost meet. It is a grey bird, possessing bronzy-green wing-coverts tipped with white, a metallic purple gloss on the secondaries, and peacock-blue outer rectrices. *Lophophaps plumifera* of North-West Australia, which has a western race, *L. ferruginea*, and a southern, *L. leucogaster*, is a terrestrial species, frequenting creeks in the desert, and running on the ground like a Quail. The nest is a mere hole in the ground lined with a little grass; the eggs are said to be creamy-white. The Plumed Bronze-wing, as it is called, has the general plumage and full crest pale cinnamon, the throat white, with a black median stripe, a black gorget, a crescentic band of grey on the chest with a black line below, and a few purple spots on the secondaries. *Geophaps scripta*, the Partridge Bronze-wing or Squatter of North-West and East Australia, has a peculiar habit of squatting on the ground or on the branches of any tree in which it takes refuge. It is light brown above and grey below, with curious black and white markings on the sides of the head and throat; the wing-coverts have pale tips, and the innermost of the greater series greenish-purple outer webs. *G. smithi* of North-West Australia is browner. From the same parts comes *Petrophassa albipennis*, which frequents rocks, though its nest has not yet been recorded; it is a reddish-brown bird with greyer head, grey centres to the feathers, and concealed purplish spots on the wing-coverts; the throat is black and white, the primaries brown with white bases. *Histrioniphaps histrionica*, of the interior and North-West of Australia, has brown upper

and grey under parts; the head is finely varied with jet-black and pure white, the secondaries shew patches of metallic-purple, and the primaries have white tips and partly rufous inner webs. The female is much duller. It is essentially a Ground-Pigeon, and breeds on the bare soil of the plains; but the flight is much stronger than might be expected, as is also the case with *Geophaps*. *Phaps chalcoptera* and *P. elegans*, of Australia and Tasmania, in their mode of life resemble the preceding, though the latter species is the more terrestrial, while both usually build in low trees or bushes. *P. chalcoptera*, the Common Bronze-wing, is extremely handsome, the greyish-brown upper surface being relieved by a purple band on the crown and most brilliant bronze and green spots upon the wing; the breast is pinkish, the throat white, and the forehead white with a wash of yellow. The inner webs of the remiges are partly rufous. *P. elegans*, the Brush Bronze-wing, is a shorter-winged bird, with chestnut throat and grey breast. *Henicophaps albifrons* of New Guinea and the adjacent western islands has the forehead whitish, the neck and under parts rich reddish-purple, the back blue-black, the wings glossed with golden-green and bronze, and their coverts margined with chestnut. The beak is longer and stouter than in the allied forms, and the bird is partly arboreal. *Calopelia puella* of West Africa is a fine cinnamon-coloured bird, with blue head and iridescent green spots on the wings. Of *Chalcophaps*, ranging from India, Burma, and South China, through the islands to Australia and the New Hebrides, Count Salvadori makes two divisions, though the species are little more than local races. Of the first of these, with golden-green mid-back and scapulars, *C. indica*, the Emerald Dove or Beetle-wing, may be taken as typical; the head is blue with white forehead and sides, the upper back is purplish, the wing-coverts golden-green, the lower back bronzy with two grey bars, the rump nearly black, and the under parts purplish-pink. The female is brown and somewhat redder below, with grey forehead. This species covers nearly the whole range of the genus, but only stretches eastward to Geelvink Bay in New Guinea. *C. chrysochlora* reaches from Timor to the New Hebrides; *C. sanghirensis* occurs in Great Sanghir Island; *C. natalis* in Christmas Island, Indian Ocean. *C. stephani*, of Celebes and Papuasia, and *C. mortoni*, of the Solomon Islands, constitute the second division, where the mid-back and

scapulars are reddish-cinnamon. These Pigeons frequent bushy districts, feed on the ground on seeds and fruits, run fast, and fly swiftly for short distances. They have a mournful note, breed on low trees, and make a fairly compact nest of roots, grass, or twigs. *Chalcopelia afra* inhabits Africa south of Abyssinia and Senegambia. It has olive-brown upper parts, with two black stripes across the lower back, and a few large spots of brilliant purple and green on the wing; the under parts are pinkish, and the inner webs of the primaries and their coverts bright rufous. *C. chalcospilus,* with the spots golden-green, is probably a variety. They inhabit bushy country in pairs, the flight, food, note, and nest being similar to those of *Chalcophaps. Tympanistria bicolor* is a similar but greyer bird, with the purple spots almost black and the lower parts white; it inhabits Southern Africa, Madagascar, the Comoros, and Fernando Po. The very long-tailed *Oena capensis* is pale brown above and white below, with black face and throat, grey crown, two black bands across the lower back, and steel-blue patches on the wings. The inner webs of the primaries and their coverts are cinnamon. The female has a white face and throat. It is a bird of rough bushy country, which is seldom found in flocks, utters a deep plaintive note, and breeds in low trees. This species walks with the utmost rapidity, and feeds upon the ground on seeds of grasses and grain. It is found in tropical and Southern Africa, in Madagascar, and at Aden and Jeddah.

Group (*d*).—The most typical Peristerinae constitute a fourth section, usually with metallic wing-spots, restricted to America. *Metriopelia melanoptera* and *M. aymara* range from Ecuador and Peru respectively to Chili and the borders of Argentina. The former is greyish-brown above and vinaceous below, with black wings and tail, the latter has golden spots on the wing-coverts. They are found in small flocks in the valleys of the Andes, and in winter on the coast, being called by the natives "Tortola cordillerana," or "Cordillera Dove." *Peristera cinerea* is bluish-grey in the male, with lighter under parts, black remiges and outer rectrices, some velvety black spots being very conspicuous on the wings and scapulars. The female is brown, with cinnamon wing-spots. This species ranges from South Mexico to Paraguay; while *P. geoffroyi,* with white-tipped lateral tail-feathers and a grey breast, inhabits South-East Brazil; *P. mondetoura,* with

chestnut breast, occurs from South Mexico to Peru. They frequent wooded and hilly districts, forming small flocks and uttering a cry resembling "huup-huup." *Oxypelia cyanopis*, of the interior of Brazil, and *Uropelia campestris*, of that country and Bolivia, link the above genus to *Columbigallina*, which contains six species. *C. passerina* extends from the southern United States and the West Indies to Peru and Paraguay; *C. minuta* occupies a similar range, except for the United States; and *C. cruziana* reaches from Ecuador to North Chili—all with naked feet; *C. buckleyi* inhabits Ecuador and Peru; *C. talpacoti*, most of South America north of Paraguay; *C. rufipennis* ranges from Mexico to the north of South America, these three having the metatarsi feathered laterally. *C. passerina* is olive-grey, with violet spots on the wing and purplish coverts; the feathers of the forehead and under parts being vinous, with dull brown centres to the latter, and those of the hinder portion of the head bluish, with dusky margins, which cause a scaly appearance. The female lacks the purple and red tints. *C. minuta*, the most diminutive Pigeon known,—though *Oena* would be smaller but for its tail,—is uniform below. The other species differ but little, though only *C. rufipennis* has, like the above, the under surface of the wing cinnamon. Flocks of the Ground-Dove or Tortolita, as *C. passerina* is called, are found amongst open woods and pastures, running about with elevated tails, and feeding chiefly upon the ground on seeds, berries, peas, and grain; if disturbed, they betake themselves with low and noisy flight to a tree; but they are usually very tame, and may often be heard uttering their mournful notes on the roofs of outbuildings. The nest, placed in low bushes or on the ground, is carefully constructed and lined with grass, two or three broods being reared in the season. The hen is said to feign disablement at its nest like a Plover, while the birds apparently dust themselves in gallinaceous fashion. *Columbula pieui*, distinguished by a blue band on the wing-coverts, occurs in South America from Bolivia and Chili eastward.

Group (*e*).—The fifth section of the Peristerinae exhibit no metallic spots or lustre, while the wings are rounded and the tail is rather long. *Gymnopelia erythrothorax*, of the mountains of Peru, Bolivia, and North Chili, is brown, with vinaceous head and breast, and remarkably large naked orbits of orange margined with black. *Scardafella* has crescentic black edges to the feathers, the upper parts being brown and the lower pinky white, while the

primaries have cinnamon inner webs. *S. squamosa*, of Brazil, Venezuela, and Colombia, has a white wing-patch, absent in *S. inca*, extending from Texas to Nicaragua. These "Scaly Doves," as they are called, seem to be essentially terrestrial. *Geopelia humeralis*, of Australia and Southern New Guinea, is brown above, with black scale-like markings, a rufous nape, a bluish forehead and chest, a pinkish breast, and a white mid-belly. The remiges are rufous on the inner web. *G. cuneata*, of Australia only, has small white wing-spots, and no black marginal markings on the feathers. *G. tranquilla*, of the same country, *G. striata*, ranging from South Tenasserim to the Philippines and the Moluccas—introduced into Madagascar, the Mascarene Islands, and St. Helena—and *G. maugii*, found from the Timor group to the Ké Islands, are distinctly banded with black and white, the first round the neck only, the other two on the breast also. These long-tailed species, resembling miniature Turtle-Doves, frequent grassy plains, thickets, or swampy river-sides in small flocks, and flit tamely from tree to tree, alighting with upturned tail; the "coo" is rarely loud; the food consists of seeds and berries, usually obtained upon the ground; the nest, placed rather low, is of twigs or grass.

Group (*f*).—*Turtur* contains twenty-eight Old World forms, reaching eastward to Japan, the Ladrones, and the Moluccas. In habits resembling the members of the genus *Columba*, they are browner in coloration, and about three quarters of the size; while some exhibit lateral patches of dark feathers tipped with blue, grey, or white on the neck, the plumage whereof in other species is bifurcated and spotted with rufous or white. Many have a black nuchal collar, and a few somewhat fawn-coloured upper parts; the lower surface is more or less vinaceous, and the rectrices, except the two median, are tipped with white or grey. The following may exemplify the range of this sixth section of the Peristerinae:—*Turtur communis*, the Turtle-Dove of Europe, winters in Northern Africa and Western Asia; *T. douraca* or *risorius* (our common cage-bird), extends from Turkey to India and Japan; *T. orientalis*, accidental in Europe, only from India to Japan; *T. tigrinus* from the Malay countries to the Moluccas; *T. dussumieri* from Borneo to the Ladrones; *T. semitorquatus*, *T. isabellinus*, and so forth, inhabit Africa; *T. picturatus* Madagascar, *T. aldabranus*, *T. comorensis*, *T. coppingeri*, *T. abbotti*, and *T. rostratus* the neighbouring

Islands. The African *T. senegalensis* is found in the Canaries, and several introduced species occur in Madagascar or Mauritius.

Group (*g*).—The seventh section of the Peristerinae is characterized by metallic spots near the ear-coverts and an iridescent gloss on the sides of the neck. *Melopelia leucoptera*, found from Texas to Costa Rica and the West Indies, and the very similar *M. meloda* of Peru and Chili, have a white wing-patch. One of the notes resembles a cock's crow. *Nesopelia*, of the Galápagos, links these closely to *Zenaida*, with six members, found from the Florida Keys, Yucatan, and the Antilles, through South America to Patagonia. *Z. amabilis*, the Pea- or Mountain-Dove of the islands from the Florida Keys to Antigua, is reddish-olive, with vinous head and breast, two peacock-blue ear-spots, black blotches on the scapulars and wing-coverts, black remiges, and a white band across the secondaries. Chiefly terrestrial, it roosts and nests either on trees or on the ground, the flight being swift, and the note very soft. *Zenaidura carolinensis*, the Mourning-Dove of North America, including Southern Canada, is not unlike the above, but has the crown, sides of the body, and edges of the wings blue, and in the male the breast purplish. Small flocks often frequent the neighbourhood of houses, while the flight is strong, the note guttural and melancholy, the food of grain, berries, acorns, shoots of plants, and apparently worms. The nest is placed indifferently on the earth or aloft.

Sub-fam. 3. *Columbinae.*—*Ectopistes migratorius*, the well-known Passenger-Pigeon, breeds in eastern North America, chiefly in Canada and the adjoining United States, and wanders to the Pacific and Cuba. Its immense colonies are seemingly a thing of the past, though as lately as 1888 a northward flight crossed Michigan, where in 1878, at Petosky, the "roost," or area occupied, is said to have been twenty-eight miles long by three or four broad. The trees were often laden with nests, and during a stay of five weeks several millions of birds are stated to have been captured, chiefly by means of nets and decoys; though earlier authors, such as Wilson, mention many different methods of slaughter. The parents were very noisy, and covered vast distances in search of food; but, save for the sharp call-note, and the single egg, the other habits were as in most arboreal Pigeons.

Coryphoenas crassirostris, of the Solomon Islands, a slate-coloured species with brownish head and crest, resembles in its

very stout bill and long graduated rectrices *Reinwardtoenas reinwardti*, ranging from Celebes to Papuasia, and *R. browni*, of the Duke of York Island and New Britain. In the two last-named the head is grey, the under parts are white, and the naked orbits red, the former having the back chestnut, the latter black. Closely allied are the two dozen Pheasant-like members of *Macropygia*, with elongated wedge-shaped tails, from the Indian and Australian Regions, which have rich chestnut, purplish-brown, or cinnamon plumage, with darker shading and iridescent sheen, chiefly confined to the upper surface. The head is usually lighter, the under parts are often buff or vinaceous, and the irides parti-coloured; the naked orbits vary in tint. Inhabiting bushy country or hills up to about eight thousand feet, they fly but short distances, feeding upon the ground on seeds and berries, and uttering a loud monotonous note. *M. tusalia*, the Cuckoo-Dove, occurs from North India to West China; *M. leptogrammica* inhabits the Malay Countries; several other species carry the range to the Moluccas; *M. tenuirostris* occupies the Philippine and Sulu Islands; *M. phasianella* the eastern half of Australia; *M. doreya* and so forth New Guinea and its islands; *M. rufa* the New Hebrides; *M. rufo-castanea* the Solomons. The two last-named have bifurcated breast-feathers.

Turacoena menadensis, of Celebes, the Togian and Sula Islands, is slate-black with golden-green occiput, neck, and breast, white face and throat, and naked red orbits; *T. modesta*, of Timor, has the orbits yellow, and lacks the white. *Turturoena delegorgii*, of Natal, is slaty-black, with a chestnut mantle surmounted by a white band, lilac and green reflexions on the occiput, neck, and chest, vinous under parts, and bare pink orbits. The female is brownish-grey, having a cinnamon head and nape glossed with green, but no white collar. *T. sharpii*, of East Equatorial Africa, differs in its green crown and nuchal region; *T. iriditorques*, found from the Gaboon to Liberia, lacks the white band, and has the lateral rectrices tipped with buff; *Nesoenas mayeri*, of Mauritius, is reddish-brown, with pink head, neck, and lower surface.

The cosmopolitan genus *Columba* contains nearly sixty members, of which comparatively few inhabit the Palaearctic and Nearctic Regions; the general coloration is blue, relieved by black and rufous, or a metallic red and green sheen. Want of space forbids a description of every form, and the following are in no definite order: but *C. palumbus*, *C. laurivora*, *C. bollii*, *C. trocaz*,

C. leucocephala, and so forth, are Wood-Pigeons; *C. livia*, *C. schimperi*, *C. affinis*, *C. intermedia*, and *C. leuconota* are true Rock-Pigeons; *C. oenas* and its nearest allies being somewhat intermediate. *C. rufina*, extending from Guatemala to Peru and Brazil, and *C. speciosa*, ranging further north to Mexico, are especially ruddy; *C. ianthina*, of Japan and the Liu-Kiu Islands, is unusually metallic; *C. grisea*, of Borneo and Sumatra, is mainly light grey; *C. polleni*, of the Comoro Islands, olive-brown; *C. arquatrix*, of Eastern and South-Western Africa, is flecked with white above and below; *C. speciosa*, only on the hind neck; *C. guinea*, of Western and North-Eastern Africa, has bifurcated neck-feathers and triangular white wing-spots; *C. leucocephala*, of the Florida Keys, Bahamas, Antilles, and Honduras, and *C. leucomela*, of East Australia, have the crown, and the latter the neck and under parts white; *C. leuconota*, the "Snow-Pigeon" of Kashmir, Yarkand, and Tibet, has the neck, lower back, and breast white; *C. palumbus*, our Ring-Dove, Wood-Pigeon, Cushat, or Queest, the habits of which are universally known, extends through the Palaearctic Region from Madeira and the Azores to Persia; it differs from the smaller and darker Stock-Dove (*C. oenas*), of the same Region eastward to Turkestan, by the white patches on the sides of its neck and the white wing-bar. *C. livia*, the Rock-Dove, from which our domestic races have sprung, is easily distinguishable from other British species by the white rump and the two black alar bands. The breeding habits of our native birds, and the damage done by flocks of Wood-Pigeons, partly composed of immigrants, have already been mentioned (p. 328). *Columba laurivora* and *C. bollii*, which lays but one egg, are peculiar to the Canary Islands; *C. trocaz* to Madeira, *C. torringtoniae* to Ceylon, *C. palumboïdes* to the Andamans and Nicobars, *C. metallica* to Timor, *C. gymnophthalma*, apparently to Curaçao, Aruba, and Bonaire, and several forms to Samoa, the Liu-Kiu, Bonin, Fiji, and other groups. *C. araucana* reaches the Straits of Magellan.

Gymnophaps albertisi, of New Guinea, is grey, with whitish breast, purplish-chestnut under parts elsewhere, and naked red orbits.

Sub-fam. 4. *Treroninae*.—This includes the Fruit-Pigeons in the widest sense, natives of the Old World, of which the bigger are contained in the first eight genera. *Hemiphaga novae zealandiae*, of New Zealand, is green, with brilliant coppery reflexions, brownish-purple back, and white abdomen; *H. spadicea*, of

Norfolk Island, and *H. chathamensis*, of the Chatham group, have greyer wing-coverts and green nape. *Lopholaemus antarcticus*, of Eastern Australia, is grey, with a fine rufous crest, black remiges, black rectrices banded with grey, and bare reddish orbits; the neck-feathers being hackled as in *Caloenas*. In *Myristicivora* the general plumage is white, but *M. bicolor*, of the Malay Archipelago, has black wing-quills and tip to the tail; the similar *M. spilorrhoa* of Australia and Papuasia, the yellower *M. subflavescens* of New Ireland, and the blacker-tailed *M. melanura* of the Moluccas, have black spots near the vent; *M. luctuosa*, of Celebes and the Sula Islands, has the remiges nearly grey.

Phaenorrhina goliath, of New Caledonia and the Isle of Pines, is slaty-black, with maroon patches on the wing-coverts and abdomen, black quills, and a broad chestnut tail-bar.

The forty to fifty species of *Carpophaga* range from India to Hainan and Fiji. *C. concinna*, found in the Moluccas, Tenimber, Ké, and Aru Islands, is metallic bronzy-green with grey head and lower surface; *C. aenea*, extending from India and Ceylon to Hainan and Flores, has more vinaceous lower parts and greener tail; *C. latrans*, of Fiji, is nearly brown above; *C. zoeae*, of Papuasia, has a chestnut mantle and black pectoral band. *C. griseipectus*, of the Philippines, has a grey back with blackish-green spots, and a chestnut lower breast; *C. basilica*, of the Halmahera group, has a pinkish-white head and upper breast, a rufous lower breast, and a broad grey tip to the tail; *C. cuprea*, of Southern India, is brown, with white throat, greyish-pink head, neck, mantle, and under parts; *C. poecilorrhoa*, of North Celebes, is glossy greenish-black above with grey head, mantle, and chest, and brown breast with ochre markings: *C. pinon*, of New Guinea and the Western Papuan Islands, is slaty-grey with a white forehead, a ring of white feathers round the naked red orbits, and a purplish-chestnut lower breast. Large flocks commonly gather after breeding. The seven species of *C.* (*Globicera*), remarkable for a fleshy knob at the base of the bill, may be represented by *C.* (*G.*) *pacifica*, ranging from New Guinea to Samoa, and *C.* (*G.*) *rubricera*, of New Ireland, New Britain, New Hanover, and the Duke of York Island. The former has a grey head, bronzy-green upper parts, bluer remiges and rectrices and pinkish lower surface, the knob being black. The latter has a vinous head, grey mantle, chestnut abdomen, and red knob.

Serresius galeatus, of the Marquesas Islands, noted for the feathered skin or "saddle" covering half the culmen, is deep glossy green, with dark grey head and under parts. All these Fruit-Pigeons feed and build on lofty trees, and seldom, if ever, descend to the ground—possessing short legs and broad-soled grasping feet; they have a powerful rapid flight and utter varied notes, occasionally deep and booming like a wild beast's roar; they eat vast quantities of fruit, and some are very fond of mice; while they normally lay two eggs, but exceptionally one.

The five splendid species of *Megaloprepia* occupy the Northern Moluccas, Papuasia, and Eastern Australia. *M. magnifica* of the latter country has a greenish-grey head and neck, golden-green upper parts with an oblique yellow band on the wing-coverts, rich purple breast and abdomen, and yellow vent. *M. formosa* of the Halmahera group lacks the yellow on the wings and has, in the male only, a crimson patch on the greenish breast. The other three species are barely separable. The habits resemble those of *Carpophaga*, the note being peculiarly hoarse.

Alectroenas comprises four remarkable forms from Madagascar and the neighbouring islands, of which *A. nitidissima* of Mauritius has become extinct within historic times, three specimens being still extant at Port Louis, Paris, and Edinburgh respectively. This species, called "Pigeon hollondais" from its colours, which are those of the Dutch flag, is indigo-blue, with white head and neck, vermilion tail-coverts and tail edged with black, and red carunculated orbits, lores, and forehead. *A. madagascariensis*, of Madagascar and Nossibé Island, has most of the neck slaty-grey, but the head blue, and the tail crimson with a wash of blue and green at the base, while the naked skin only surrounds the eyes. *A. pulcherrima* of the Seychelles, to which the name of "Pigeon hollondais" has been transferred, has the neck and breast grey, the upper parts, including the tail, black with blue reflexions, the crown crimson, the orbits, lores, and forehead wattled. *A. sganzini* of the Comoro Islands differs in having a grey head and only the orbits bare. Throughout the genus the long, loosely webbed and bifurcated neck-feathers resemble hackles in appearance. The members are, according to circumstances, tame and stupid, or shy and wary; they are arboreal and fly powerfully, while they feed on dates, figs, berries and grain, the flocks being very destructive to rice-crops. *Drepanoptila holosericea*, of New Caledonia and

the Isle of Pines, with its feathered white metatarsi and fork-tipped primaries, is green, with grey wing- and tail-bars, white throat and yellow abdomen, the last being divided from the breast by a yellowish-white and a black band.

Of the smaller Fruit-Pigeons, which differ but little in habits from the larger, the lovely genus *Chrysoenas* is confined to Fiji. *C. luteovirens* has an olive-yellow head, and a bright yellow abdomen and collar; the remaining plumage being yellow, more or less tinged with green, especially on the wings and tail. The feathers of the neck and back are narrowly lanceolate and the tail-coverts long. The female is green, with a yellow wash below, and has nearly brown remiges. *C. victor* is bright orange, with olive-yellow head and throat and browner wing-quills; the coverts almost conceal the tail, but the long decomposed body-feathers are not especially narrow. The female is green, with yellowish head and orange-margined remiges. *C. viridis* is dark green, with a golden hue on the back and breast, the head being almost yellow, as are the edges of the quills. The female is green. with grey vent-region. The seventy or more brilliantly coloured members of the genus *Ptilopus* range from the Malay Peninsula to the Marquesas; New Guinea and Polynesia accounting for a large majority. The following are some of the most striking. *P. jambu* of the Malay Peninsula, Sumatra, Borneo, Bangka, and Billiton has the front half of the head crimson, the upper parts bright green, the primaries black, margined with bluish-green, the tip of the tail yellowish, and the under parts white, with a purplish-brown streak down the throat, a rosy smear on the breast, and a red-brown anal region. The female has dull purple on the head and a greyish-green breast. The following three species have bifurcated breast-feathers. *P. dupetit-thouarsi* of the Marquesas has the crown whitish, encircled by a yellowish line, the upper surface green with yellow margins to the wing-quills and tip to the tail, the scapulars and inner secondaries spotted with blue, the under parts yellowish-green, with a cherry-coloured patch surrounded by orange on the breast, the throat and vent pale yellow. *P. swainsoni* of Eastern Australia, straying to South-East New Guinea, has a rose-lilac forehead and crown with a yellow margin behind, bright green upper parts with yellow edges to the wing-quills and peacock-blue tips to the inner secondaries and scapulars, a yellow tip to the tail, a

pale yellow throat, a dull green breast with silvery grey tips to the feathers, and a lilac band dividing this from the orange abdomen. The female is rather brighter green. *P. superbus* of the Moluccas, Papuasia and North Australia, has a purple cap, rufous-orange nape and sides of the neck, rich green upper surface, with deep blue spots on the scapulars and wings and a patch of the same colour at the bend of the latter, black primaries with yellow margins, a whitish throat, and a purple and grey breast, separated from the white abdomen and green and white vent by a broad violet-black band. The female has green upper parts, with blue spots on the wing-region and one on the occiput, and a grey and green breast. *P. insolitus* of New Ireland, New Britain, and the Duke of York Island, with its curious orange frontal knob, is green, with grey lesser wing-coverts and inner secondaries, a grey-tipped tail, an orange abdomen, and a yellowish vent-region. *P. aurantiifrons* of Papuasia has a yellowish-green head with orange forehead; a white throat; grey neck, upper breast, tip of the tail, and spots on the scapulars and wing-coverts; the remaining plumage being chiefly green. *P. nanus* of the same districts, the smallest of the Sub-family, is bronzy-green with a greyish band on each side of the breast, a yellow vent, and a purple abdominal patch, lacking in the female. *Phabotreron* is a group of similar species confined to the Philippines. *P. amethystina* is bronzy-brown with an amethystine nape and lower surface, the cheeks are crossed by a black line over a white one, the throat is reddish, the tip of the tail grey. The lines on the cheeks and a rounded tail are characteristic of the genus.

The remaining members of the Treroninae are of a greenish or yellowish coloration, generally varied with patches or bands of dull purple, red, orange, or lilac—nearly or quite absent in the females, except in *Vinago*, where the sexes are similar. This genus is Ethiopian, while the others reach from India eastward to Japan, Formosa, and the Moluccas. *Osmotreron* contains a dozen and a half species, of which the following may serve as examples. *O. vernans*, ranging from the Malay countries to Cochin-China, the Philippines, and Celebes, has a greyish head and throat, vinaceous-purple neck, dull green upper parts, yellowish-green lower surface with an orange pectoral patch, rufescent upper and chestnut under tail-coverts; the wing-quills are black with yellow margins to the coverts, and the grey tail exhibits a black sub-

terminal bar on the lateral feathers. The small *O. olax* of the Malay Peninsula, Sumatra, and Borneo, has the back maroon, the head and neck grey. *O. pompadora* of Ceylon has the forehead and throat yellow, the mantle maroon, and the median rectrices green. *O. aromatica* of Bouru differs in having no yellow forehead, and the bend of the wing blackish.

Treron nipalensis and the very closely allied *T. nasica* are found from Bengal and Nepal to the Indo-Malay Islands, the Philippines, and Cochin-China; they have grey heads, chestnut mantles, black wings with yellow edges to the coverts and secondaries, cinnamon under tail-coverts, grey lateral rectrices banded with black, and green plumage elsewhere. *Butreron capellii*, of the Malay Peninsula and neighbouring islands, has the head and upper parts greyish-green, the wings nearly as in the last species, the throat and abdomen yellowish-green, the breast orange, and the under tail-coverts chestnut.

Crocopus, with its three similar members, extends from India and Ceylon to Cochin-China. *C. chlorigaster* has a grey head and tail, a yellowish-green neck and under surface, a grey band across the mantle, a yellow alar bar, an olive-green back and rump, a purple patch at the bend of the wing, and rufous and white lower tail-coverts.

Half a dozen species of *Vinago* range from Senegambia and Abyssinia to Madagascar and Cape Colony. *V. waalia*, found from West to North-East Africa, has a greenish-grey head and neck, olive upper parts, blackish-brown remiges with yellow outer margins, a rich vinous patch on the wing-coverts, a slaty-blue tail, a bright yellow breast, and a buff abdomen. *V. calva*, of the Ethiopian Region northward of Angola and the Zambesi, has a curious bare forehead and frontal swelling, a yellowish-green head, neck, and lower surface, and a grey collar at the base of the hind-neck. *V. crassirostris* is confined to St. Thomas and Rollas Islands, West Africa; *V. australis* to Madagascar. *Sphenocercus*, with some eight members, having wedge-shaped tails and a general resemblance in colour, reaches from North India, Sumatra, Borneo, and Java, to Japan and Formosa. *S. sphenurus*, of the Himalayas and the Burmese countries, has the head, neck, and under parts greenish-yellow with a rufous tinge, the back purplish- and bluish-green, the rump and wing-coverts olive with a maroon patch on the latter, and the remiges slaty-black with yellow

margins. *S. sieboldi* is peculiar to Japan, *S. sororius* and *S. formosae* to Formosa, *S. permagnus* to the Liu-Kiu Islands.

Comparatively few fossil forms of the Columbidae have been discovered, but *Columba* occurs in the Lower Miocene of France and in Malta, while *Lithophaps ulnaris* and *Progura gallinacea* are recorded from the Queensland Drifts, and *Alectoroenas? rodericana* is an extinct species from Rodriguez.

CHAPTER VI

NEORNITHES CARINATAE *CONTINUED*

BRIGADE II—LEGION II (CORACIOMORPHAE). ORDERS: CUCULIFORMES—CORACIIFORMES

Order XII. CUCULIFORMES.

THE Order Cuculiformes commences the last great division of Carinate Birds. It contains the Sub-Orders CUCULI and PSITTACI: the former consisting of the Families *Cuculidae*, or Cuckoos, and *Musophagidae*, or Plantain-eaters; the latter of the *Psittacidae*, or Parrots, Parakeets, Macaws, and Cockatoos, and the *Trichoglossidae*, or Lory group. Zygodactylous feet (p. 10) are characteristic of the Order, while further structural details are to be found below. Dr. Gadow confirms the close connexion of the two Sub-Orders.[1]

Fam. I. **Cuculidae**.—Here we may accept, in default of full anatomical investigation, the Sub-families of Captain Shelley,[2] namely, (1) *Cuculinae*, (2) *Centropodinae*, (3) *Phoenicophainae*, (4) *Neomorphinae*, (5) *Diplopterinae*, and (6) *Crotophaginae*.

The bill is generally long and curved, being strongly arched in *Hyetornis*, *Piaya*, *Taccocua*, and *Zanclostomus*; it is straight in *Saurothera* and *Rhinortha*, abnormally large in *Rhamphomantis* and *Scythrops*, and has the maxilla compressed into a thin elevated plate in *Crotophaga*. The scutellated metatarsi are commonly stout, and are especially long in the cursorial genera *Coua* and *Geococcyx*; in *Centropus* the hallux terminates in an elongated spur-like claw. The wings are long and straight in the Cuculinae, Diplopterinae, and Crotophaginae, short and curved elsewhere; the primaries numbering ten, and the secondaries usually nine or ten, but thirteen in *Scythrops*; in the Neomorphinae the quills are about equal in extent. The rounded

[1] Bronn's *Thier Reich, Aves, Syst. Theil*, 1893, pp. 212-223.

[2] *Cat. Birds Brit. Mus.* xix. 1891, pp. 209-210

or wedge-shaped tail is nearly always long, and has ten feathers, except in the Crotophaginae, which have eight; it is forked in two species of *Surniculus*. *Diplopterus* has the upper coverts half as long as the rectrices, *Dromococcyx* has them of the entire length. The impervious nostrils, usually pierced in a swollen membrane, are hidden by bristly plumes in *Dasylophus* and *Lepidogrammus*. The furcula is Y-shaped, the tongue is sagittate with retroverted spines on the posterior margin, the syrinx is tracheo-bronchial or occasionally bronchial. Distinct eyelashes are often visible, the after-shaft is rudimentary or absent, the nestlings are naked, and down is only found in adults on the unfeathered spaces.

The plumage of the more typical Cuckoos is brownish or grey, usually with barred under parts, the long flank-feathers covering half the metatarsi; *Chrysococcyx*, however, contains several beautiful emerald-green forms; while *Chalcococcyx* is scarcely less brilliant; but *Surniculus* and *Cuculus clamosus* are black. *Crotophaga* is also black. *Coccystes*, and several species of *Coua*, have well-developed crests, while *Lepidogrammus* has a rounded tuft, *Guira* one of long narrow plumes, and *Geococcyx mexicanus* an erectile patch. Fork-tipped feathers on the head and neck are not uncommon. The colour of the bill, feet, and iris varies much; the cheeks and orbits are often naked, and may be bright red, blue, or greyish, as in the Phoenicophainae and Centropodinae. Strong glossy feather-shafts, often with filiform extremities, are found in *Coua*, *Taccocua*, *Phoenicophaës*, *Rhopodytes* and elsewhere, on the head, neck, mantle and chest; *Crotophaga* has stiff, scale-like borders, and *Lepidogrammus* metallic horny tips, to the feathers of the first two of these; *Dasylophus* has fine crimson hair-like tufts springing from above each eye. The beak may be black, green, yellowish, or even, as in *Rhamphococcyx*, chiefly red. The sexes are alike in most cases.

The Ethiopian and Indian Regions are richest in Cuculidae. New Zealand possesses only two species; but Madagascar, besides other forms, claims the entire genus *Coua*. In all there are more than a hundred and sixty species of some forty-two genera.

Sub-fam. 1. *Cuculinae.*—*Cuculus canorus*, the familiar Cuckoo of Britain and nearly all the Old World, is greyish-brown above and on the throat, the lower parts being white barred with dusky, and the wings and tail shewing a few white markings. A chestnut-brown or "hepatic" phase is sometimes met with.

The young are brown mottled with white on the nape. Its flight and general coloration give the Cuckoo a distinctly Hawk-like appearance, and cause it to be systematically mobbed by small birds, while ignorant peasants persecute it mercilessly, and assert that it "changes to a Hawk" in winter. Certain other members of the Family have the same raptorial aspect, notably the Asiatic Hawk-Cuckoo (*Hierococcyx*); whereas several of the Centropodinae unconsciously mimic Pheasants in their colour,

FIG. 69.—Cuckoo. *Cuculus canorus*. × $\frac{2}{7}$.

in their red orbits and their wedge-shaped tail. *Geococcyx* is still more like a Galline bird in some respects; and *Surniculus* is a decidedly good imitation of a Drongo (Dicruridae).

In early April the Cuckoo's note heralds the approaching summer in Britain, and continues to be heard until June, after which it becomes hoarser and the first syllable is doubled; in July the adults begin to disappear, yet stray examples—chiefly, if not entirely, young—remain up to October, when they migrate as far as South Africa, Ceylon, and Celebes. None breed south of North Africa and the Himalayas. The eggs are invariably deposited in the nests of other birds, which rear the intruder and feed it until it leaves the country; but it is doubtful how many are

produced in a season — possibly five or six—or whether the same hen ever places two or more in one nest. It is now certain that the egg is laid on the ground and conveyed to the chosen nursery in the bill, an occurrence said to have been actually witnessed by Adolf Müller, a forester in Darmstadt.

Closely connected with the above parasitic habit is the question of the colour of the egg. Red or blue specimens have undoubtedly been found in Germany and elsewhere, as well as the typical brown or greyish varieties; but they do not always assimilate to those of the foster-parent, albeit to the eggs of Pipits, Wagtails, and so forth, that of a Cuckoo is often exactly similar. The theories advanced to account for this are by no means conclusive, though hereditary habit may afford a clue; we may, however, be sure that the hen cannot determine the colour of her egg.

With us the most usual foster-parents are the Meadow-Pipit, Pied Wagtail, Reed Warbler, Hedge-Sparrow and Robin, perhaps in the above order. They seldom, if ever, seem to resent the intrusion, or to notice their consequent losses. The careful observations of Jenner, Hancock, and Mrs. Blackburn shew that the young Cuckoo, when some thirty hours old, begins unaided to remove from the nest the rightful progeny or unhatched eggs by means of its broad back, which has a central depression for the first twelve days; but after this hollow is filled up the desire is said to cease. It pushes below a nestling with its wings, and raises it with much exertion to the edge of the nest, finally ejecting it by a supreme effort.

The probable reason why the Cuckoo's egg often hatches first is the hen's habit of selecting nests with only one or two fresh eggs. Subsequently she neglects her offspring entirely. It is stated that the males, who alone utter the well-known notes, decidedly outnumber the females, and that no strict pairing takes place; while in the courting season a curious bubbling sound, attributed to the hen, may be heard as two or three individuals chase each other along the hedgerows. Wooded districts and bare hill-moors are equally frequented, trees being constantly used as perches. The quick, straight flight is varied by twists and swoops; the food consists of insects and their larvae, the stomach often becoming lined with hairs of caterpillars. Our Cuckoo does not eat eggs, but various foreign species add to their diet seeds and other fruits, land-molluscs, worms, frogs, lizards, small snakes, birds, and mice. *Chalcococcyx lucidus* bruises its food before swallowing it.

The genus *Coccystes*, of South Europe, Africa, and Tropical Asia, includes the Great Spotted Cuckoo (*C. glandarius*), which has twice occurred in Britain, a crested greyish-brown bird, with a yellowish throat, white under parts and markings above. In Southern Spain and Northern Africa it deposits from two to four eggs in the nests of the Magpies, *Pica rustica*, *P. mauritanica*, and *Cyanopica cooki*, or of the Grey Crow, *Corvus cornix*; these eggs, like those of the foster parents, being pale green with brown and lilac markings. The note of the male is "kee-ou, kee-ou" or "kark-kark," of the female "burroo-burroo." *C. coromandus*, chiefly greenish- and bluish-black above with rufous wings and white nuchal collar, and buff below with grey abdomen, ranges from India and Ceylon to China and Celebes, laying roundish, plain green-blue eggs in nests of *Crateropus* and other birds, and having a true Cuckoo's note. *C. serratus* of South Africa, which is greenish-black with a white alar band, is somewhat terrestrial, and lays a white egg in nests of *Pycnonotus* and *Sigelus*.

Surniculus lugubris, extending from India to China and the Malay Islands, is black, with green and purple reflexions and a few scattered white markings. The tail is sometimes forked. *Cacomantis passerinus*, of India, Java, and Sumatra, is grey, having an olive gloss above, blue-black rectrices with white bars, and white abdomen. It frequents jungles, utters a plaintive series of whistles, continuing for hours, and lays bluish eggs with purplish markings in various birds' nests. *C. virescens* of Celebes and Bouru is said by Dr. Meyer to build its own nest. *Chrysococcyx smaragdineus*, of Tropical and Southern Africa, is a lovely emerald-green bird, with yellow breast and white-barred lateral rectrices. The female has a partially rufous head and mantle, coppery, bronze, and green upper parts, and white lower surface banded with green. The males whistle loudly to their mates for long periods, perched on tall trees, or hawk for insects in the air. *C. cupreus*, of the same countries, is in both sexes coppery-green varied with white above, and white with bronzy bars below; it is called "Di-dric" from its cry, and lays white eggs in Sun-birds' and Finches' nests. The similarly coloured *Chalcococcyx lucidus* of Australia, New Zealand, and the Chatham Islands has a reiterated plaintive note, with the effect of ventriloquism, and foists its greenish-white eggs with brown spots upon *Acanthiza* and *Gerygone*.

Of *Eudynamis*, ranging from India and Ceylon to Australia

and Polynesia, the black males are barely distinguishable, but the females vary, and are black, brown, rufous, and white. *E. honorata*, the noisy Indian Koël, has a loud melodious or hoarse whistling note, supposed to portend rain; it feeds on fruit, and lays from one to four greenish eggs with brown and grey blotches in nests of Crows. *E. melanorhyncha* is the "foreteller at night" of Celebes.[1] The extraordinary *Scythrops novae hollandiae*, or Channel-bill, of Australia, Papuasia, and the Moluccas, has a grey head, brownish back, and whitish under parts with indistinct dusky bars, the tail exhibiting a subterminal blackish and a terminal white band. The large maxilla has two lateral grooves, the bare lores and orbits are scarlet. This big bird flies like a Hawk, and is possibly parasitic; while eggs, taken from the oviduct, are white with pinkish-brown spots. The weird cry or shriek is syllabled "krok," and the flocks feed on fruits and insects.

Coccyzus americanus, the Yellow-billed Cuckoo of America, has occurred in Britain, and ranges from the Great Plains, Canada, and New Brunswick to Argentina; it is an arboreal species, pairing and building—apparently twice a year—a slight flat nest of twigs, grass, and moss, lined with leaves. It lays from three to five light greenish eggs, and the hen feigns lameness when danger threatens the young. *C. occidentalis* is a more western form. *C. erythrophthalmus*, the American Black-billed Cuckoo, has been killed in Ireland and Italy. The coloration in the eight members of this genus is brownish-grey, relieved by rufous, the under parts being buff or white.

Sub-fam. 2. *Centropodinae*.—This group comprises only the thirty or more large Coucals (*Centropus*) of the Ethiopian Region, Egypt, Madagascar, India, and the countries thence to China, Papuasia, and Australia. *C. sinensis*, the Crow-Pheasant, extending from India and Ceylon to China, is black with purple and green reflexions, the mantle being chestnut; *C. unirufus* of the Philippines is entirely rufous. They are strong-billed, long-legged birds with terrestrial tendencies, noisy yet often shy, which fly heavily, run, climb, leap, or glide with up-turned tail about the trees in forests and jungles, and utter a mellow "hoo-too" or a chuckle. The food consists of insects and their larvae, molluscs, reptiles, small mammals, and nestling birds. They make a large globular nest of twigs and leaves, or even of rushes, grass, and rags,

[1] For superstitions connected with Celebes Cuckoos, see Meyer, *Ibis*, 1879, pp. 67-70.

with a lateral hole; it is placed in a tree, a thorny bush, or a tuft of herbage. The three to six oval eggs are white or bluish with a readily-stained chalky coating; the young are soon able to skulk among the foliage. *C. toulou* is held sacred in Madagascar.

Sub-fam. 3. *Phoenicophainae.*—*Taccocua sirkee*, the Indian Sirkeer, has somewhat similar habits, but makes a flat nest. It is olive-brown above, relieved by black and white, and rufous below. *Coua* is peculiar to Madagascar, *C. caerulea* having loose blue plumage, glossed with violet on the tail, and dark blue naked orbits; but the other species are more olive or grey, with black or rufous on the head, throat, or mantle. The large, shy members of this handsome genus frequent the edges of forests; but whereas five species fly heavily and climb well, jumping from branch to branch with elevated rectrices, occasionally assisted by their beaks, the remaining seven rarely leave the ground, where they run about with the tail trailing. The note is a harsh "tashu" or a sharp "turruh"; the food consists of seeds, insects, worms, small mammals, birds, and molluscs—the last broken on stones; the nest of twigs and fibres is placed in high trees, and contains two or three white eggs.[1]

Saurothera, *Hyetornis*, and *Piaya* are the "Rain-birds" of the Bahamas and Antilles, the latter genus extending to Bolivia and Argentina. They are inactive, wary birds, which hide and creep about with outspread tails when in the trees, but are more at ease upon the ground; the cry is a loud harsh scream or cackle; the food consists of insects, berries, lizards, and mice; the flat nest contains two or three white eggs. *P. cayana* is reddish-brown above with a violet tinge, and grey below with pinkish throat; the tail shewing a subterminal black bar and a white tip, and the bare orbits being red. *Phoenicophaës pyrrhocephalus* of Ceylon is dark green, with bluish wings, blackish head and chest, tail varied with white, and white breast; the forehead and sides of the head being red and rugose. It is a fruit-eating forest species, said to be parasitic, though the allied *Rhopodytes* of the Indian Region lays two or three white eggs in a slight nest of sticks and leaves, while the pugnacious *Rhamphococcyx calorhynchus*, the "foreteller by day" of Celebes, builds a similar structure.[2]

Sub-fam. 4. *Neomorphinae.*—*Geococcyx mexicanus*, the curious Chapparal-Cock or Road-runner of the South-Western United States and Mexico, frequents thinly-wooded country, hilly cactus-

[1] Cf. Sibree, *Ibis*, 1891, pp. 218-219. [2] Cf. Meyer, *ut supra* (p. 356).

regions or barren plains. The plumage is brownish, with white margins to the feathers and a purple tinge on the rufous-mottled head, neck, and breast; the back is greener, the tail more lilac, the abdomen white, the bare orbits blue and red. With its long stout legs this species covers the ground very quickly, running with outstretched neck, elevated crest, slightly expanded wings, and jerking tail, or springing into trees and taking brief flights:

FIG. 70.—Radiated Ground-Cuckoo. *Carpococcyx radiatus.* × $\frac{1}{6}$. (From *Nature.*)

it is even difficult to outpace it with dogs or on horseback. It eats insects, snapping some in the bill as it leaps into the air, and enjoys grasshoppers, mice, and lizards; in captivity it is thievish. The note is low, the beak being occasionally clattered. The nest of twigs and grass, placed in bushes, contains from three to nine white eggs, the male apparently assisting in incubation. *Carpococcyx radiatus* of Borneo, and *C. viridis* of Sumatra, are the only Old World species in this group.

Sub-fam. 5. *Diplopterinae.*—*Diplopterus naevius,* a pale brown

bird with darker streaks and white under surface, may represent this Central and South American group, of which the only other members are two species of *Dromococcyx*.

Sub-fam. 6. *Crotophaginae*.—Of these birds, peculiar to the New World, *Crotophaga ani*, the Ani, Black Parrot, or Savannah-blackbird, extending from the Southern United States and the Antilles to most of South America, is glossy purplish- or greenish-black, and has the smooth maxilla compressed into a thin vertical plate, which, like the bare orbits, is black. Its grotesque appearance and alleged malpractices have given it the name of Black Witch in the West Indies. *C. sulcirostris*, ranging from Texas to Peru, has the bill grooved; *C. major* of South America is larger and greener. Far from shifting the burden of incubation upon other species, the females form huge co-operative nests of interlaced twigs lined with green leaves in trees, wherein each deposits some five bluish eggs with a chalky incrustation, amounting in all to twenty or more. Around or upon these structures they sit in company. Bold but wary, the Anis flit from bush to bush, or creep and jump about the branches, uttering a mewing sound or a sharper double cry. They are often mobbed by other birds. Flocks gather in wooded or marshy spots, and feed on insects, berries, lizards, and so forth; occasionally digging for their prey, or picking the ticks off cattle.

Guira piririgua, of Brazil, Paraguay, and Argentina, is brown and buff above with darker streaks, and buff below, the back and tips of the lateral rectrices being white. From the similarity of habits to *Crotophaga* it is termed the White Ani in Brazil. Flocks draw near the houses in winter, and sit miserably huddled together on the trees; the note is a long disyllabic whistle, or in the young an hysterical laugh. Usually each pair makes a rough nest of twigs and leaves, laying six or seven pale blue eggs with reticulated chalky coating; though fourteen have been recorded.

Fam. II. **Musophagidae**.—The Plantain-eaters are striking birds, peculiar to the Ethiopian Region, without Madagascar. They have large eyes and long necks; while the bill, though small in *Gallirex*, is generally stout and broad with compressed or rounded culmen and serrated margin, and in *Musophaga* expands into a broad frontal plate behind. The feet are semi-zygodactylous, with reversible outer toe and strong claws; the robust metatarsi are scutellated anteriorly and coarsely granulated posteriorly.

The wings are rather short and round, with ten primaries and twelve or thirteen secondaries; the rounded tail of varying length has ten rectrices. The furcula is U-shaped; the tongue sagittate—with bristly apex in *Gallirex;* the nostrils—hidden in *Turacus*—are usually oval, but are linear in *Schizorhis* and *Gymnoschizorhis;* the aftershaft is large; the nestlings lack down. The red or grey orbits are naked, save in *Schizorhis;* in *Gymnoschizorhis* the cheeks and throat are bare and blackish.

The six genera comprise two dozen or more species from about

Fig. 71.—Green-mantled Turaco. *Gallirex chlorochlamys.* × ¼.

thirty to fifteen inches in length; the general coloration being metallic blue and green or greyish-brown, usually varied with crimson, and in the large *Corythaeola* with yellow; all have erectile crests of different sizes, except *Musophaga violacea.* The bill is red, yellowish, or black, the feet are black. The sexes are alike, the young duller. The red feathers yield a peculiar pigment, containing copper, called Turacin, which is reducible to a powder; this is so soluble that the colour is washed away during rain or in a bath, though regained subsequently.[1]

Plantain-eaters are found in pairs, or in small flocks of four to ten, over wooded country near inland or tidal waters, reaching an altitude of some ten thousand feet. The tops of high trees are

[1] See Church, *Phil. Trans.* 1869, pp. 627-636; *op. cit.* 1893, pp. 511-530.

a favourite haunt, but they are not uncommonly seen amongst the tangled creepers below, flitting from shrub to shrub with undulating flight when disturbed, and alighting with crest erect and up-turned tail. Of some species the flight is clumsy and jerky, of others light and graceful; at times they hover in the air with outspread wings and tail, at times they sport and hop among the branches, expanding and depressing the rectrices. Familiar yet extremely shy and restless, these birds, when wounded, are particularly hard to secure, as they run with great swiftness, and even take refuge in holes in trees. During rain or in the mid-day heat they rest quietly on some bough, but at other times are usually noisy, their harsh reiterated screaming or ringing notes being varied by a cat-like mewing or dove-like sound. The food consists of bananas, tamarinds, papaw-apples, and other fruits, with insects, worms, caterpillars, molluscs, or even small birds. They are occasionally mobbed by their kin, as Cuckoos are. Though some species have been asserted to breed in holes, *Schizorhis concolor* makes a flat nest in trees, and *Gymnoschizorhis leopoldi* a loose platform of thorny twigs and roots, both species laying three round greenish- or bluish-white eggs. The flesh is considered a delicacy by the natives.

Turacus (*Corythaix*) *fischeri* of East Africa is green, washed with blue on the wings and tail, having a crimson crest tipped with black, a crimson hind neck with white nape, a blackish lower chest and abdomen, and black cheeks margined above and below with white; the remiges are crimson, edged with black, the bare orbits red. *T. corythaix* is called the Lory in South Africa. *Musophaga violacea* of West Africa is glossy violet-blue with darker tail, the crown and hind-neck being covered with short, hairy, crimson feathers and partially outlined with white; the chest is greenish, the frontal plate yellow; the wing-quills and orbits are as in *T. fischeri*. *Schizorhis concolor* of South Africa is nearly uniform ash-coloured; *Gymnoschizorhis personata* of Shoa is greyish-brown with paler crest, whitish head and neck, blackish naked cheeks and throat, and dirty green breast.

The remarkable fossil *Necrornis* occurs in the Middle Miocene of France.

Of all existing Birds the Parrots (Sub-Order PSITTACI) are perhaps the most interesting to the public, being easily procurable,

docile, and long-lived pets of gorgeous coloration and amusing habits. The red-tailed Grey Parrot of Africa (*Psittacus erithacus*) is considered the best talker, yet, apart from individual ability, many species of *Palaeornis, Chrysotis,* and other genera, are equally clever, if we cannot say intelligent. Professor Skeat identifies the name Parrot with the French *Pierrot;* but, however that may be, Indian species have been known in Europe since the time of Alexander the Great, and one or more African forms were kept in ornamental cages, and even eaten, at Rome under Nero.

In default of a really satisfactory arrangement we may accept that of Dr. Gadow,[1] who agrees in the main with Count Salvadori,[2] and recognises the Family *Psittacidae,* with Subfamilies *Stringopinae, Psittacinae,* and *Cacatuinae;* and the Family *Trichoglossidae,* with *Cyclopsittacinae, Loriinae,* and *Nestorinae.*

There are in all about eighty genera containing some five hundred species, but the variety arises chiefly from colour, while the beak alone would sufficiently determine the Family. This feature is usually short and stout, with strongly arched maxilla and mandible, the former being moveable and hinged to the skull, and the latter truncated. In *Nestor* and *Loriculus* the curve is more gradual and the depth less; in the Cyclopsittacinae and some Psittacinae the bill is distinctly notched; in the Stringopinae, Nestorinae, and other Psittacinae it is grooved; while a file-like surface with transverse ridges, below the overhanging hooked tip, distinguishes the Psittacidae from the Trichoglossidae. At the base is generally a large swollen cere, or a similar but very narrow band in various Psittacinae; in the Platycercine group this is very small, and it is more or less hidden by feathers in certain Psittacinae, Cacatuinae, Cyclopsittacinae, and Nestorinae. The feet are permanently zygodactylous, the metatarsus being short—except in Ground-Parrots—compressed, and covered with rugose scales. The abbreviated rounded wings of the terrestrial *Stringops,* where the keel of the sternum is correspondingly reduced, are comparatively useless; while these members, though usually moderate, may be long, as in *Nasiterna* and *Cacatua,* or more acute, as in the Loriinae; the primaries are ten in number, the secondaries from eight to fourteen. The tail varies much, being short and square with projecting spiny shafts in *Nasiterna,* longer with

[1] Bronn's *Thier-Reich, Aves, Syst. Theil,* 1893, pp. 221, 222.
[2] *Cat. Birds Brit. Mus.* xx. 1891, pp. viii. 2.

acuminate feathers in *Stringops*, moderate in the Loriinae and Cyclopsittacinae, elongated and wedge-shaped in *Conurus*, *Ara*, *Psittacula*, and many species of *Palaeornis*, long and broad in *Platycercus* and *Cacatua*, and so forth. *Oreopsittacus* possesses fourteen rectrices, every other genus twelve; in *Prioniturus* the median pair have bare shafts and raequet-tips.

The U-shaped furcula is sometimes entirely absent; a completely ossified orbital ring occurs in the Cacatuinae, Stringopinae, and many Psittacinae; the tongue is short and fleshy, being fringed in the Nestorinae, or having a brush of hairs towards the tip in the Loriinae and *Nanodes;* the uniquely modified syrinx has three pairs of tracheal and tracheo-bronchial muscles; and a crop is present. The aftershaft is large, the down of the adults and young is uniform, the latter being naked when hatched.

The coloration is commonly gaudy, and particularly so in

FIG 72.—Uvaean Parakeet. *Nymphicus uvaeensis.* $\times \frac{1}{2}$. (From *Nature.*)

Macaws; yet some species are sober in tint, and that of the beak and feet varies considerably in different forms. *Stringops* has a disc of stiff feathers round the eye, *Nymphicus* and the Cacatuinae possess crests, *Deroptyus* broad erectile nape-plumes. Bare foreheads, cheeks or orbits, of a red, pink, blue, yellow, black, grey, or white hue are found in *Microglossus, Cacatua, Licmetis, Anodorhynchus, Cyanopsittacus, Ara, Poeocephalus, Psittacus, Coracopsis,* and *Dasyptilus;* while powder-down patches or tufts occur on the neck, shoulders, and sides of the Cacatuinae, *Psittacus,* and *Chrysotis.* The length varies from some thirty inches in the Great Black Cockatoo (*Microglossus*) to about three in the diminutive *Nasiterna pygmaea.* The name Macaw is applied to *Ara* and its nearest allies, Love-bird to *Agapornis* and *Psittacula,* Parakeet to *Platycercus* and *Palaeornis,* Lorikeet to *Loriculus, Charmosyna,* and *Coriphilus,* Lory to *Eclectus, Trichoglossus, Lorius, Chalcopsittacus,* and *Eos,* King Lory to *Aprosmictus.*

Parrots usually feed and roost in company, though in *Eclectus* the habits are said to be more solitary; the males are, however, monogamous, each courting a single female, which twitters and rolls the head from side to side when love-making. The haunts include wooded districts, grassy plains, or even rocky hills and sandy flats; *Stringops* being almost entirely terrestrial, *Melopsittacus* and *Neophema* (Grass-Parakeets), with *Geopsittacus* and *Pezoporus* (Ground-Parakeets), being mainly so, while Cockatoos and many other forms habitually frequent high trees, though *Cacatua galerita, Licmetis nasica,* and several species of *Platycercus* spend much time upon the ground. Most Parrots walk with considerable ease, and climb well; their flight is commonly low and undulating, but is comparatively strong in *Nestor,* the Macaws, the Lories, and the like; the last-named climb less, and often hop along the ground. *Loriculus,* when sleeping, generally hangs by one foot. Little drink seems necessary, as the vegetable food is ordinarily succulent; plantains, papaw-apples, figs, and tamarinds being varied by flowers, buds, leaves, hard palm-nuts, and fruits of *Platanus, Casuarina, Banksia, Cactus,* or *Capsicum.* Grass-Parakeets and their nearest allies subsist almost entirely on grass-seeds and grain, *Licmetis* and some other Cockatoos dig for tubers and bulbs, *Calyptorhynchus* and *Nestor* search the bark of trees for insects, while the latter and the Loriinae suck honey from the flowers of *Phormium* and *Eucalyptus.* *Nestor notabilis,*

the New Zealand Kea, eats the flesh of living sheep, an acquired taste as remarkable as it is destructive. Parrots alone among Birds habitually manipulate their food in their claws, these claws, moreover, greatly aiding them to creep about the branches or to cling to the mouth of their breeding-holes. The usual cry is harsh and discordant, Lories and Macaws making an especially deafening noise; but Cockatoos, besides their scream, utter a softer sound, *Loriculus* has a monosyllabic note, *Nymphicus* and *Melopsittacus* quite a pretty warble. The female hisses when caught upon her eggs, and in captivity many forms talk and whistle. Holes in trees, crevices in cliffs or caves, cavities under stones or roots, and even shallow depressions in the soil, seldom with any bedding, serve for a nest; the spherical or somewhat pointed eggs, which are often deposited in confinement, being dull white, occasionally with a greenish tinge or brownish incubation-stains. The larger species usually lay one, two, or three, some of the smaller as many as twelve, the size varying greatly (pp. 367, 372). *Palaeornis* habitually cuts a circular hole in rotten trees, and even bores to a depth of three feet; *Pezoporus* is said to make a mass of grass and rushes in tussocks, *Myiopsittacus monachus* a globular fabric with a side entrance; *Nasiterna, Psephotus, Cyanolyseus,* and *Conurus* will breed in holes in ants' nests or steep banks. The male occasionally assists in incubation, and two broods may be reared in a season. Small or large colonies are sometimes formed, and in both the Old and New Worlds large flocks seriously damage ripe maize and corn, or oranges and other fruits. The birds are often killed for eating, and their feathers used for ornament; for caging, they are limed, captured with decoys, or taken from the nest.

The headquarters of Parrots are in the Australian Region and the Malay countries, which possess a majority of the genera and peculiar species; next follows the Neotropical Region; the Indian and Ethiopian are comparatively poor; the Palaearctic possesses no existing representative; and the Nearctic but one, *Conurus carolinensis,* which early in this century extended northwards to the Great Lakes, but now only inhabits Florida, Arkansas, and Indian Territory. *Cyanolyseus patagonus* and *Microsittace ferruginea* occur at the Straits of Magellan, *Poeocephalus robustus* at the extreme south of Africa, *Cyanorhamphus erythrotis* in Macquarie Island; while many forms occupy most limited areas, especially in the West Indies and the Pacific. Of *Coracopsis mascarinus*

of Réunion, *Nestor productus* of Phillip Island, and *N. norfolcensis* of Norfolk Island, only a few specimens exist, and those in collections; *Palaeornis exsul* of Rodriguez and *Conurus pertinax* of St. Thomas in the West Indies are verging upon extinction. A Macaw seems to have disappeared from Jamaica, and six Parrots from Guadeloupe and Martinique.

The sexes of all the species described below are alike, unless otherwise stated, the young being commonly duller.

Fam. III. **Psittacidae.**—Sub-fam. 1. *Stringopinae.*—*Stringops*

Fig. 73.—Kakapo. *Stringops habroptilus.* $\times \frac{1}{5}$. (From *Nature.*)

habroptilus, the Kakapo or Tarapo of New Zealand, has sap-green upper parts, with yellow middles to the feathers and transverse brown markings; yellower lower surface; and browner cheeks, remiges, and rectrices. The soft plumage, the disc of feathers round the eye, and the nocturnal habits have given this bird the name Owl-Parrot. During the day it usually hides in holes near the ground, emerging towards evening to feed greedily on mosses, bracken, seeds, berries, such as those of *Coriaria sarmentosa,* and even lizards; while the companies make tracks a foot or more wide across the herbage. The Kakapo inhabits alpine districts or open

forests; it climbs well and walks swiftly, but has such limited powers of flight that the natives hunt it on foot by torch-light, or with dogs, which are often seriously wounded by the powerful bill. The note is a croak, grunt, or shriek. Two or three eggs, as large as those of a pullet, are deposited in burrows under tree-roots or rocks, without any nest. It makes a tame and playful pet.[1]

Sub-fam. 2. *Psittacinae*.—Of this group the nocturnal *Geopsittacus occidentalis* of South and West Australia, and *Pezoporus formosus* of the same countries and Tasmania, somewhat resemble *Stringops* in general coloration. The latter, which has an orange frontal band, rarely resorts to trees, but crouches, skulks, or trusts to its great running powers, flying at most only some hundred yards, with a rapid twisting motion. It haunts sandy plains or marshy districts, laying two or three eggs on a bedding of grass and rushes in long tussocks of herbage.

Our common cage-bird, *Melopsittacus undulatus*, the Australian Grass-Parakeet or Budgerigar, has a yellow head, with three black cheek-spots surmounted by a blue patch; the nape, back, and wing-coverts are yellow with black transverse markings, the remiges brown with green outer webs and yellow margins, the rump and under parts green, the two long median rectrices blue, the lateral tail-feathers green banded with yellow. These graceful and lively little birds are partly terrestrial, often flocking in thousands to feed upon the seeds of grasses, while they sit motionless during the heat among the foliage. The flight is quick and direct; the note shrill, or warbling; the conduct of individuals towards one another amicably quarrelsome. From three to six eggs are deposited in hollow branches, with no nest. The name Grass-Parakeet is shared with *Neophema* of Southern Australia and Tasmania, distinguished by a blue frontal band sometimes extending around the eyes. *N. petrophila*, the Rock-Parakeet, breeds in holes in steep cliffs near water, *N. pulchella* also shewing a liking for rocks. *Porphyrocephalus spurius* of West Australia has a maroon crown and nape, green upper parts, black remiges with blue bases and primary coverts, and blue lower surface with scarlet and yellow vent. The flight is swift, the note clucking.

Of the beautiful Australian genus *Platycercus*, *P. elegans*, also found in Norfolk Island, may serve as an example: it is crimson-red with black on the dorsal feathers; the cheeks, bend of the wing,

[1] Cf. Buller, *Birds of New Zealand*, 2nd ed., i. London, 1888, pp. 176-191.

primary-coverts, outer webs of quills and the tail being blue. The dozen species haunt grassy hills, feed upon seeds, berries, insects and their larvae, run easily, take short flights, rise with outspread tail, and lay from four to seven eggs in holes in trees without a nest. *P. eximius* is the Roselle Parakeet of dealers.

Loriculus vernalis is green, tinged with yellowish below and with orange on the back; the rump is red; the throat, the inner webs of the wing-quills, and the under surface of the tail are bluish. The female has little blue on the throat. The flight is rapid, but the birds are not shy; they are found in pairs or small flocks, and are said to suck honey from the flowers. They breed as does the last-mentioned species.

The Ethiopian genus *Agapornis* shares with the Neotropical *Psittacula* the appellation Love-bird, due to their habit of sitting huddled together, their mutual caresses, and their intense devotion to each other. If one dies, its mate not uncommonly pines away. *A. roseicollis* of South Africa is green above and yellower below, the forehead being red, the cheeks and throat rose-coloured, the rump and median rectrices blue; the lateral tail feathers exhibit blue tips, red bases, and a black band. It is found in flocks near water, flying quickly, uttering shrill, rapid notes, feeding on berries and the like, and commonly breeding in Weaver-birds' nests. *A. cana* of Madagascar, introduced into the neighbouring islands, has the head, neck, and breast grey; *A. taranta*, of North-East Africa, the forehead red, the rump and tail green; *A. pullaria*, of West Equatorial Africa, the face orange-red. The sexes differ only in these three species, wherein the under wing-coverts are black in the male, but green in the female, which lacks the grey or red, and in the third case has the face yellowish.

Two dozen members of *Palaeornis* range from Senegambia to Abyssinia, the Mascarene Islands, India, Ceylon, the Burmese Countries, South China, and the Great Sunda Islands. *P. eupatria*, the Rose-banded Parakeet or Alexandrine, and *P. torquata*, the Rose-ringed Parakeet, are similar species from the Indian Region; they are green, with rose-coloured nuchal collar, black neck-stripes, bluish median and yellow and green lateral rectrices, all tipped with yellow, and in the former a red wing-patch. The female shews no pink or black. These birds frequent both hills and plains, being often found in societies; they have a loud musical note, feed on fruits and grain, and lay some four eggs on the chips in a hole cut out by themselves.

The genus *Eclectus*, extending from the Moluccas with the Tenimber Islands to the Solomon Archipelago, has green males and red females. *E. pectoralis* of Papuasia is green, with red sides, blue remiges and lateral rectrices edged with green, and yellow-tipped tail. The female differs in having the head, chest, and upper parts bright red, the end of the tail lighter, the breast, abdomen, edge of the wing and a dorsal band blue.

Dasyptilus pesqueti of New Guinea is black, with the tail-coverts, abdomen, sides, much of the wings, and a lateral band on the occiput red; the crown- and nape-feathers are narrow and pointed, the face and throat nearly naked and black. It lives at considerable altitudes in couples or small companies, eating fruit, and uttering a loud, harsh cry. *Coracopsis vasa*, the Vasa or "loud-voiced" Parrot of Madagascar, sacred to royalty in one of the tribes, and its lesser compatriot, *C. nigra*, are blackish-brown, with grey wings, rump, and tail, and yellowish naked orbits. The small flocks are partly terrestrial, but fly high; the cry is shrill; the food consists of seeds and other fruits and roots. *C. vasa* has been introduced into Réunion, *C. comorensis* and *C. sibilans* inhabit the Comoros, *C. barklyi* the Seychelles.

That clever talker, *Psittacus erithacus*, the Grey Parrot, which ranges across Equatorial Africa, is ashy-grey, with black primaries, red tail, and whitish naked face. It walks well, and climbs admirably by the aid of its beak, flying with chattering screams at considerable elevations, consorting in large companies, and probably nesting in holes in trees. *P. timneh* is not known to talk.

Pococephalus robustus of Southern Africa is green, with brownish head, neck, remiges and rectrices; it has vermilion thighs, bend of the wing, and, occasionally, forehead; and naked orbits. The habits call for no special mention. *Caica melanocephala* of Guiana and Amazonia is green, with yellow cheeks, throat, sides and tip of the tail, a rufous nuchal collar, whitish lower parts, black primaries margined with blue, and green and black naked orbits. *Gypopsittacus vulturinus* of the Lower Amazons is chiefly green, yellow feathers tipped with black covering the throat, and forming a band at the back of the naked but hairy black head: the thighs are yellow stained with red; the upper wing-coverts blue margined with green, except the lesser, which are orange and red; the primaries are blue and black; the secondaries greener: the rectrices green and yellow, tipped with blue.

The two score members of *Chrysotis*, commonly termed Amazons, range from Central America to Argentina. *C. aestiva*, not found north of Brazil, has the plumage mainly green with black edgings, the forehead and lores blue, the crown, cheeks, and throat yellow, the primaries black, blue, and green. The secondaries exhibit red outer webs, the lateral tail-feathers red bases and yellowish tips. Entirely yellow varieties rarely occur in the wild state, but are often produced artificially. These birds breed

FIG. 74.—Grey Parrot. *Psittacus erithacus*. $\times \frac{1}{3}$.

in holes in high trees, and fly in small flocks, which utter screaming cries, and feed on plantains, berries, oranges, and so forth.

Psittacula contains the green Love-Birds of Central and Tropical South America; they are sometimes tinged with yellow, and have blue on the rump and wings in the male.

Myiopsittacus monachus, the Monk or Loro, of Bolivia, Paraguay, Uruguay, and Argentina, is green, with grey throat, breast, and head, except the occiput; a blue tinge shewing on the wings, and yellow on the lateral rectrices. It is very common and tame near Buenos Aires, being devoted to favourite spots, and playing havoc with garden fruit, which it pecks and leaves hanging, while at times companies feed on thistle-seeds or devastate grain-fields.

Its flight is swift but unsteady, with rapid strokes of the wing and folded tail; yet it mobs Birds of prey, while its noisy chatter disturbs the other woodland species. A nest of thorny twigs, used for shelter throughout the year, is usually woven round the end of some branch, and has a vestibule and an inner chamber, which are repaired before the thin-shelled eggs, from six to eight in number, are laid. Though the entrance, with its overhanging eaves, is in the side or beneath, Opossums and Ducks occasionally take possession. A tree may contain several of these dwellings, which often jointly form a mass sufficient to fill a cart, though not communicating with one another.[1] *Cyanolyseus patagonus*, of Argentina and Patagonia, is brownish-olive, with red on the belly, yellow on the rump and flanks, blue on the primaries, green on the secondaries, and a whitish gorget. The flight is strong though wavering; the cry loud, short, but pleasing; the food consists of shoots, buds, and seeds; the breeding places are holes in banks. *Conurus carolinensis*, of Florida, Arkansas, and the Indian Territory, is green, with paler lower parts, yellow head and upper neck, orange forehead and cheeks. It frequents wooded creeks or swamps, feeding on cypress-seeds, beech-mast, and so forth, and breeding in company in holes in trees without any nest. Nearly thirty species of the genus range from Mexico and the West Indies to Bolivia and Argentina, *C. guarouba* of North-East Brazil being yellow with green remiges, *C. solstitialis* of Guiana and Brazil mainly reddish-yellow with blue and green wings and tail.

Of the fifteen or more large members of *Ara*, *A. chloroptera*, the Red-and-blue Macaw, *A. macao*, which differs in its yellow and green wing-coverts, and *A. militaris*, the Red-and-green Macaw, occur from Mexico and Central America to Bolivia; *A. ararauna*, the Blue-and-yellow Macaw, and *A. severa*, the Green-and-blue Macaw only extend from Panama southwards. The naked flesh-coloured face is crossed by lines of feathers, except in *A. macao*. The four closely allied Brazilian species of *Anodorhynchus* and *Cyanopsittacus*, or Hyacinthine Macaws, are almost uniform blue. The flight of these gorgeous birds is powerful, their note harsh and screaming, while they crush and eat hard nuts of various kinds.

Nasiterna pygmaea, one of some nine Pigmy Parrots, is green, with dusky markings on the upper surface, yellowish crown, reddish forehead and middle of the lower parts; the two median

[1] Gibson, *Ibis*, 1880, pp. 3-6.

rectrices are blue, the rest chiefly black, with yellow spots on the outer. The female lacks the red and yellow tints. Small flocks of these birds frequent high trees, creeping about them with the aid of their wings and tails, like Tree-creepers, and at midday dozing in fancied security on the lower branches. They feed upon seeds, and are stated by von Rosenberg to lay two eggs, no larger than those of the Long-tailed Tit, in holes in trees.[1]

Sub-fam. 3. *Cacatuinae.*—Of the Cockatoos, which are restricted to the Australian Region, the Philippine and the Sulu Islands, *Cacatua galerita* of Australia and Tasmania, one of the forms with narrow recurved crest-feathers, is white, with the erectile tuft and ear-coverts yellow, the plumage being lax and powdery. *C. leadbeateri* has a red crest banded with yellow and tipped with white, and a rosy tinge on the head and lower surface. Other species exhibit broad straight white, yellow, or red crests, *C. roseicapilla* being decidedly pink below and grey above. In this group the bare orbits may be blue, red, grey, or white. These tame and active birds love open wooded country, and often form immense flocks; they fly strongly, hop well, utter loud shrill screams, doze in the heat, feed on roots grubbed up from the ground, seeds and grain, and play havoc with crops of maize and the like. Two or three somewhat pointed eggs are deposited in holes in trees or crevices of rocks.

FIG. 75.—Leadbeater's Cockatoo. *Cacatua leadbeateri.* ×¼.

[1] Cf. Salvadori, *Ornitologia Papuasia e Molucche*, i. Torino, 1880, p. 125.

The half-dozen crested members of *Calyptorhynchus*, which are brown or black with a greenish gloss, and a whitish, red, or yellow band across the lateral rectrices, have a more laboured flight and a comparatively low whining cry; they feed on seeds of *Banksia* and *Casuarina* and on caterpillars. *Callocephalon galeatum* is grey, with a scarlet head and crest. In these two Australian genera the supposed females exhibit yellow markings. *Microglossus aterrimus*, the Great Black Cockatoo of North Australia and Papuasia, is greyish-black with a long narrow crest, and naked red and yellow cheeks. It is a retiring bird, found in pairs among high trees in thick forests; the flight is comparatively weak, the note a plaintive whistle; the food consists of seeds of *Pandanus*, *Canarium*, palm-shoots, and the like; the egg is laid on a bed of twigs in a hollow tree. *Calopsittacus novae hollandiae*, the crested Australian Cockatoo-Parakeet, is dark grey, with yellow forehead and cheeks, orange ear-coverts, and white wing-patch. The female has yellow marks on the tail and under parts. By no means shy, the flocks feed chiefly on the ground, while individuals fly well and love perching on dead branches.

Fam. IV. **Trichoglossidae.**—Sub-fam. 1. *Cyclopsittacinae.*—This includes *Neopsittacus* and *Cyclopsittacus* of Timor, North-East Australia and Papuasia, which are coloured red, green, blue, and yellow; the peculiarities of structure have already been mentioned.

Sub-Fam. 2. *Loriinae.*—*Trichoglossus novae hollandiae*, Swainson's Lory, is blue, with green head and central abdomen; the remaining under parts being red, the sides, nuchal collar and inner webs of the lateral rectrices yellow. Flocks haunt the *Eucalyptus*-forests of Eastern Australia and Tasmania, uttering incessant screams, flying swiftly and directly from tree to tree, settling again with a dash, creeping and clinging around the branches, and extracting honey from the flowers with their brush-tipped tongues, besides eating seeds. From two to four eggs are deposited in holes in trees. The various species of *Trichoglossus* range from Celebes and Timor to Australia and the New Hebrides. *Ptilosclera versicolor*, of North and West Australia, is green, with yellowish streaks on the body, bluish cheeks and nape, red crown, lores and breast. *Coriphilus taitianus* of the Society Islands is dark blue, with the lower surface chiefly white; *C. ultramarinus* of the Marquesas shews a combination of light and dark blue. *Lorius* extends from the Moluccas to the Solomon

Archipelago; *L. lory* of Papuasia being red, with black crown, blue nape, upper back, central breast and abdomen, and tip of the tail; while the wings and middle portion of the rectrices are green. In habits these three genera seem to resemble *Trichoglossus*. The members of *Eos* (Red Lory) are red, relieved by blue, except *E. fuscata*, which is dusky, with red and yellow markings; they extend from the Sanghir and Tenimber Islands and the Moluccas to the Caroline and Solomon groups. *Chalcopsittacus* of Papuasia has purplish-black, olive, or green species, usually varied with red.

Sub-fam. 3. *Nestorinae*.—This contains only the genus *Nestor*, with five species, of which *N. norfolcensis* of Norfolk Island, and *N. productus* of Phillip Island are extinct, while *N. esslingi* is hardly valid. *N. meridionalis*, the New Zealand Kaka Parrot, is olive-brown, with reddish cheeks and collar, crimson rump, abdomen and under wing-coverts, brown tail and breast, and grey crown. Several races have been described, varying in the amount of red. The Kaka is fearless, social, sprightly, and noisy, though semi-nocturnal and apt to retire to the deep forest during daylight. It utters harsh rasping and chuckling notes, or musical whistles; while it climbs trees with the aid of its beak and feet, and searches the dead wood for insects. It flies in lofty circles, or at times hops about the ground; the food consists largely of juicy fruits, blossoms, and nectar from the Rata (*Metrosideros robusta*) or the New Zealand flax (*Phormium tenax*). In semi-captivity this bird is a good mimic and talker, but terribly destructive to furniture, clothing, and orchard produce; the Maories keep it as a lure, encircling the metatarsus with a bone ring fastened by a cord to the perch. Four oval eggs are laid in hollow trees, in crevices of rocks, or under stumps and roots, occasionally on fragments of bark. *Nestor notabilis*, the Kea of the south island of New Zealand, has olive-green plumage with blackish margins; the wings and tail are varied with blue and yellow, the latter having a brown subterminal band; the rump and under wing-coverts are scarlet. The female is duller. It frequents rugged slopes of high snowy mountains, descending to the lowlands in winter; the small companies soar aloft, fly from peak to peak, or search for insect-food among the stunted vegetation. Tame, inquisitive, and destructive, the natural habits and food resemble those of the Kaka, allowing for the difference of haunts; but this bird will scream or mew, and lays larger and

rougher eggs in crevices of rocks. As is well known, the Kea has of recent years become carnivorous, chasing sheep and devouring their flesh. Perching near the tail and clinging to the wool, it digs a deep hole with its powerful beak, and apparently aims at

FIG. 76.—The Kea or Mountain Nestor. *Nestor notabilis.* $\times \frac{1}{4}$. (From *Nature.*)

the kidney-fat, the mandible cutting while the hooked maxilla ensures a firm grip. The propensity is said to have originated from the bird pecking at sheep-skins hanging outside country stations. As it sometimes necessitates the abandonment of sheep-runs, or even attacks horses, a price has been set upon its head.

Of fossil Parrots, *Psittacus* occurs in the Lower Miocene of France, the large *Necropsittacus rodericanus* in Rodriguez, and the still bigger *Lophopsittacus mauritianus*, known from an old picture to be crested, in the Mare aux Songes in Mauritius.

Order XIII. CORACIIFORMES.

The Order Coraciiformes contains the Sub-Orders CORACIAE, STRIGES, CAPRIMULGI, CYPSELI, COLII, TROGONES, and PICI, and includes a large number of arboreal forms with comparatively short legs, which often nest in holes, and have blind and helpless young. The group coincides with the *Picariae* of Nitzsch and Mr. Sclater, except in so far that the former author included the *Psittaci*, the latter the *Cuculi*, while both kept the *Striges* separate.

The Sub-Order CORACIAE consists of the Families *Coraciidae* or Rollers, *Momotidae* or Motmots and Todies, *Alcedinidae* or Kingfishers, *Meropidae* or Bee-eaters, *Bucerotidae* or Hornbills, and *Upupidae* or Hoopoes.

Fam. I. **Coraciidae.**—Two Sub-families may be recognised of these Old World birds, (1) *Coraciinae*, and (2) *Leptosomatinae;* the latter containing only the remarkable "Kirombo" of Madagascar.

Sub-fam. 1. *Coraciinae.*—Most of the twenty or more species of Rollers are brilliant blue and green, varied with reddish, and bear a resemblance to certain of the Crow-tribe, especially to the genus *Cissa*. The short metatarsus, however, scutellated in front and reticulated behind, is a clear distinction, as in *Cissa* and so forth it is longer and smooth behind, with elongated scutes anteriorly. It is comparatively long in Ground-Rollers, but they are quite unmistakeable. The bill is strong, decurved, and slightly hooked, being broad and depressed in *Eurystomus ;* the toes are moderately stout with curved claws, while the second and third are united basally ; the wings are long, broad and rounded, or shorter in Ground-Rollers, with ten primaries and about thirteen secondaries ; the twelve tail-feathers vary in length, five species of *Coracias* having them very long, and one spatulate. The furcula is U-shaped, the syrinx is tracheo-bronchial, the nostrils are hidden by bristly feathers, the tongue is thin and horny, the aftershaft is small, while there is no down on adults or nestlings. The sexes are similar, the young duller.

The genus *Coracias* ranges over temperate Europe, all Africa, and Central and Southern Asia eastwards to Celebes, where *C. temmincki* alone occurs. *C. garrulus*, which strays to Britain, and breeds from Sweden and Omsk to North Africa and North India, has the head, most of the wing-coverts, and the lower surface light greenish-blue, a red-brown back, dusky and blue remiges, ultramarine bend of the wing and rump, and greenish

tail with light blue on the lateral feathers, the outer pair alone having black tips. In the similar *C. abyssinicus* the two outer rectrices are elongated and tapering; in the more purple *C. spatulatus* they are cobalt-blue with black shafts produced into small racquets. *C. naevius* has an olivaceous back, reddish-lilac head and under parts, a white nuchal patch, white streaks on the breast, blue rump, bend of the wing, lateral rectrices and outer portion of the remiges. The genus *Eurystomus* occupies Tropical Africa, and extends from India to Manchuria, Australia and the Solomon Islands, occasionally reaching New Zealand. *E. glaucurus*, of Madagascar and Anjuan Island, is bay above and lilac below, with nearly ultramarine wings and cobalt tail tipped with blackish; *E. orientalis* is bluish-green, with blackish head, remiges and rectrices, some blue on the wing-coverts, an azure patch on the primaries, and a purple throat. *E. australis* is similar, and is termed the Dollar-Bird from exhibiting its circular light wing-patch when flying.

The members of these two genera are active, noisy, and pugnacious, though shy; they are usually diurnal, but are occasionally observed hawking for insects at dusk; when disturbed they attempt to hide in some neighbouring tree, while they also roost or take refuge from the heat among the foliage. The flight is swift, though not sustained, the wings being closed from time to time; at the courting season the male darts through the air with many a turn and twist, expanding and contracting his tail; and both sexes have the habit of rolling or turning somersaults in their course, and of puffing out their cheeks and throat. The note is a harsh "rack-rack-kack" or "racker-racker," uttered while perched or flying; the food, largely procured when hopping on the ground, and frequently jerked into the air before being swallowed, consists of small reptiles, frogs, beetles, worms, slugs and grasshoppers, if not of grain. Rollers frequent wooded country up to an altitude of about two thousand feet, in pairs or moderate-sized flocks; they occasionally sit huddled together on some branch, but love to perch on tall bare trees or wires, whence they energetically challenge Hawks and Crows. The four or five oval glossy white eggs are sometimes laid on a mass of roots, grass, hair, and feathers, in cavities in walls or under eaves of buildings; but more usually with little or no bedding in holes in trees or banks. In the breeding season the cock summons the hen from her nest, if danger threatens, while both parents

dash at an intruder, or settle near him, jerking the head and tail. Many adults are slaughtered for decorative purposes.

The Ground-Rollers, *Atelornis, Uratelornis, Geobiastes* and *Brachypteracias,* are curious forms, peculiar to Madagascar. *A. pittoïdes* has green upper parts with a ruddy tinge, white bars across the short primaries, a fine blue head and tail, except for the two brown median rectrices, and a reddish-fawn lower surface divided by a blue band from the white throat. *A. crossleyi* has a rufous head and black gular stripes. *Uratelornis chimaera* is a nearly allied form. *Geobiastes squamigera* has the upper back reddish-brown, the lower green; the head and under parts are buff, with black scale-like markings, and a black line down the crown. The primaries are brownish, the tail shews a curious combination of green, blue, black, and brown. *Brachypteracias leptosomus* is yellowish-green above, with bluish margins to the feathers, and a purplish-brown head and neck, while the brownish tail has a subterminal black and a terminal white bar; it is white below, banded or striped with chestnut and black. These forest-species are almost entirely terrestrial and crepuscular, running about in solitary fashion in the dusk, and carefully examining the ground for insect-food, or scratching for worms and the like; occasionally they fly to a low branch, jerking the tail as they alight. The eggs are said to be white.

Sub-fam. 2. *Leptosomatinae.*—This contains only *Leptosoma discolor,* the Kirombo or Vorondreo of Madagascar and the Comoro Islands, which has a big crested head; a long, slightly hooked bill, overhung at the base by recurved loral feathers; linear nostrils, placed far forward and covered by a horny plate; metatarsi scutellated on both aspects; and a partly reversible outer toe. The wings are moderate, having ten primaries and twelve secondaries; the long, square tail has twelve feathers; the tongue is tapering, horny and channelled; a large aftershaft is present, and there is a considerable powder-down patch on each side of the rump. The head is grey, glossed with copper and green, the neck duller; the upper parts are shining green and coppery-red, the under parts grey with white abdomen. The slightly larger female is reddish-brown above, with buff markings and only a dull gloss; the head is chiefly black, and the lower surface fawn-coloured spotted with black. This curious bird is very noisy throughout the day, uttering its note, which resembles the

syllables "tu-hou" thrice repeated, either while hovering in the air or while ascending or descending in vertical fashion. Meanwhile the wings are struck against the body, and the throat puffed out like a bag. It is found in the forests in flocks of about a dozen, perching and squatting lazily on the branches, and scarcely moving when its neighbours are shot; the food consists mainly of grasshoppers, chamaeleons, and lizards; the

FIG. 77.—Kirombo. *Leptosoma discolor*. $\times \frac{2}{7}$.

nest is said to be made of rushes and placed in holes, the eggs to be white. One female is often accompanied by several males. The Malagasy consider that the "Reò" brings ill-luck, and make it the theme of various tales and chants.[1]

Fam. II. **Momotidae.**—The Motmots and Todies fall naturally between the Rollers and Kingfishers, but are also closely connected with the Bee-Eaters, which do not occur in the New World. They compose the Sub-families (1) *Momotinae* and (2) *Todinae*, the former ranging from South Mexico and the Antilles to Paraguay, while the latter are restricted to the Greater Antilles.

[1] For this, as most Madagascar birds, see Grandidier, *Histoire de Madagascar*, and Sibree. *Ibis*, 1891, pp. 194-228, 416-443, 557-565; 1892, pp. 103-119, 261-271.

Sub-fam. 1. *Momotinae.*—Motmots have loose-webbed green, blue, cinnamon, and black plumage; the sexes being barely distinguishable, and the young similar to the adults, but with less developed tail. The length varies from six and a half inches to twenty. The head is generally rather narrow; the bill is Crow-like, with a few rictal bristles, and has the margins of the mandibles more or less serrated; in *Prionirhynchus* it is unusually broad and strongly keeled. The scutellated metatarsus is of no great length, the third digit being united to the fourth for about a third of its extent; the wings are rather short and rounded, with ten primaries and eleven secondaries. The tail-feathers are generally twelve, though *Baryphthengus* has only ten; they are very distinctly graduated, as is well seen from beneath, the median pair being much elongated with racquet-tips, except in *Hylomanes, Aspatha* and *Baryphthengus.* The furcula is U-shaped; the tongue is long, thin and frayed out towards the apex into laminae which point forwards; the syrinx is tracheo-bronchial; the after-shaft is small; while neither adults nor nestlings possess down.

Motmots are not shy birds, though they inhabit dense forests and seldom visit the outskirts; they prefer the vicinity of streams, where they may be seen, solitary or in pairs, flitting before the traveller from tree to tree, or sitting motionless on the lower branches, whence they make sudden dashes to secure their prey. This consists of insects caught in the air, small reptiles, or fruit; but in captivity they will eat bread, raw meat, small birds and mammals, often rapping live creatures on the ground or on their perch before swallowing them, as is done by Todies, Kingfishers, and Hornbills. The flight is brief, while the short legs are ill-adapted to the ground. The long, soft, "flute-like" note recalls that of the Hoopoe, and may be syllabled "Hu-tu," this being a native name in some parts; it is most commonly heard at dawn, while the bird's habit of jerking its tail up and down as it utters each syllable is comparable to that of Barbets and Toucans. Three or four round, creamy-white eggs are deposited, without any nest, in holes in trees or banks, probably bored by the birds themselves; both sexes being said to incubate in turn. Motmots with racquet-tipped rectrices have been shewn to produce that shape by nibbling off the vanes.[1]

Urospatha martii, ranging from Costa Rica to Amazonia, is

[1] Cf. Salvin, *P.Z.S.* 1873, pp. 429-433.

oil-green above, with a blue tinge on the blackish primaries and the end of the tail, the two median rectrices being much elongated and having terminal blue racquets; the under parts and head are cinnamon, the cheeks black, while a tuft of long black feathers adorns the neck below. *Eumomota superciliaris* of Central America is green above, with cinnamon mantle and blue remiges and rectrices tipped with black, the two median tail-feathers having elongated bare shafts with broad racquet-tips, half blue and half black. On the sides of the head are black bands and light blue eyebrows, while the throat is black with long blue lateral feathers, and the abdomen chestnut. *Momotus brasiliensis*, extending from Guiana to Northern Brazil, is somewhat similar in colour, but has little red on the back: the head is cobalt-blue with black on the crown and sides; the under parts are green with a rufous tinge. The long throat-feathers are black with light blue edges. *Aspatha gularis* of Guatemala is bright green above, and has a yellowish breast; the abdomen and throat are pale blue, with a black tuft at the base of the latter; the sides of the head are reddish-fawn with black ear-coverts. The tail is normal.

FIG. 78.—Motmot. *Momotus brasiliensis*. × ⅓.

Sub-fam. 2. *Todinae*.—This includes four diminutive species of the genus *Todus*, structurally resembling the Motmots; the tail, however, being short and square, the wings abbreviated with only ten secondaries, the beak flattened and but faintly serrated, and the rictal bristles well-developed. The long metatarsus is

covered with one scale; the marginal laminae of the tongue point backwards.

Todies frequent hilly districts and woods, and especially the vicinity of ravines, being very active on their feet, and taking short rapid flights from branch to branch when disturbed. They used to be considered close allies of the Flycatchers, probably owing to their habit of darting out upon their prey from some branch, to which they return immediately. They sit with upturned bill and head drawn in, their wings vibrating and their plumage puffed out, and when thus perched they are so unsuspicious that they may sometimes be caught with a butterfly-net, or even with the hand. The pugnacious males chase each other, clattering their bills, and, while courting, ruffle themselves up and droop their wings. The three or four globular white eggs are laid in a hole low down in the face of some bank, which is excavated to a considerable depth and commonly turns at right angles; the terminal chamber usually containing a slight nest of fibres, grass, moss, or cotton. In captivity Todies make engaging pets.

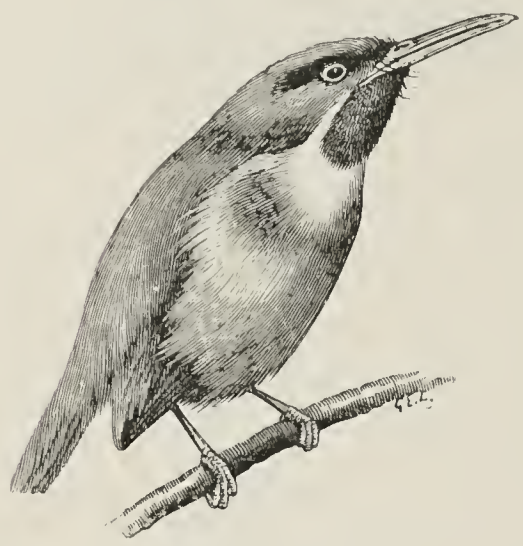

Fig. 79.—Tody. *Todus viridis.* $\times \frac{5}{8}$.

The coloration is green, with a bright red throat, yellowish-white or pinkish under parts, and yellow, green, or pink feathers on the flanks. The bill is dull red. *Todus viridis* inhabits Jamaica; *T. subulatus* Hispaniola; *T. multicolor*, which has a blue spot on each cheek, Cuba; *T. hypochondriacus* Porto Rico. The length varies from three and a half to four and a half inches.

Fam. III. **Alcedinidae.**—The Kingfishers, with the Subfamilies (1) *Halcyoninae*, or Wood-Kingfishers, and (2) *Alcedininae*, or Water-Kingfishers, are remarkable not only for the aberrant species found among them, but also for their peculiar forms and particularly brilliant colours, at once strikingly contrasted and tasteful. The head looks disproportionately large, an appearance often heightened by the crest and the long, stout bill. This feature in the Alcedininae is compressed and sharp-pointed, with keeled culmen and upcurved genys; in the Halcyoninae it is broader and rounder, and sometimes grooved. In *Syma* the maxilla is

serrated, as in the Momotidae; in *Carcineutes* and *Dacelo* it exceeds the mandible, and in *Melidora* it is hooked. The feeble metatarsi are scutellated or rarely reticulated: the third and fourth toes are joined for most of their length, the second and third for one joint, all being broad below; the claws are sharp and curved. *Ceyx* and *Alcyone* have the second digit aborted. The wings are short and rounded, yet powerful, the primaries being eleven in number, with the outer much reduced, the secondaries from eleven to fourteen; the tail is commonly abbreviated, but in *Tanysiptera* has a median pair of greatly elongated racquet-tipped feathers; that genus, moreover, possesses but ten rectrices instead of twelve. The furcula is U-shaped, the syrinx is tracheo-bronchial, there is no aftershaft, the adults are uniformly downy, the nestlings are naked. The tongue is rudimentary, though said to shew an approach to that of the Motmots in *Pelargopsis*. The sexes may be similar or dissimilar, even in the same genus; the young are like their parents, or somewhat duller. The colours of the Family are most variable, a combination of blue, green, and chestnut being frequent, while almost uniform red, or black and white, are not uncommon; the beak may be black, red, yellow, or parti-coloured. About twenty genera, with some hundred and fifty species, occupy nearly the whole globe, though by far the greater number are found from Celebes to Papuasia, while *Ceryle* alone is American.

The habits in the Family are as diverse as the styles of plumage. The Water-Kingfishers love shady haunts by quiet lowland streams, where the fishes which form their chief diet abound; in such situations they may be seen sitting patient and motionless on some favourite overhanging bough or projecting stone, from which they dart out like an arrow upon their prey. If successful, they return immediately to their perch, on which they beat the fish before jerking it down the throat. At other times they hover over the water with vibrating pinions, or dive perpendicularly with closed wings. They are not, however, entirely piscivorous, but eat insects and small crustaceans, especially when they seek the sea-shore, as do several species of *Halcyon*, *Alcedo* and *Ceryle*, including our native Kingfisher, chiefly towards winter. In tropical countries reeds and sugar-canes serve for perches. The flight is straight and quick, but not long sustained; the note is either high-pitched, and of two or three syllables, which may be

likened to "tit-it-it," or is loud and harsh; it is most frequently heard as the birds skim over the streams in the anxious time of breeding, while the young have similar cries, and are very noisy just before leaving the nest, which they render extremely foul. The eggs are laid in holes in perpendicular river-banks, disused gravel-pits and the like, or even in cavities in walls or rotten stumps, the circular tunnel usually penetrating to a depth of two or three feet, and forming an enlarged terminal chamber. The number of eggs varies from four to ten in different species; they are round, white, glossy, and thin-shelled, and look very pink when they are fresh; they usually lie on a bed of fish-bones, consisting chiefly of vertebrae, not uncommonly deposited before laying begins. *Ceryle rudis* is stated to make a nest of grass, *C. amazona* one of sticks and straw, the former at times breeding in colonies. The male has been known to assist in incubation, which lasts a fortnight or more; while two broods are occasionally reared in the season, especially in warmer climates. The Wood-Kingfishers prefer shady forest-regions, not necessarily near water, but also frequent the vicinity of houses; their food consists of insects caught in the air, caterpillars, reptiles, frogs, crustaceans, worms and molluscs, though they occasionally eat fish. The nests, placed in holes in trees or banks, are said in some cases to be of a few straws, dry leaves, or moss. The genus *Dacelo* and its allies, including the largest forms of the Family, are natives of Australia and New Guinea, where they often inhabit very dry situations. They will even eat small mammals or birds, bruising them before deglutition, and lay two or three white eggs in holes in trees without any nest. The note is an extraordinary loud gurgling or barking sound, from which they are called "Laughing Jackasses."

Kingfishers are difficult to keep in captivity, while hard frosts cause much mortality, though the use of the feathers for artificial flies or for ornament adds to the scarcity. The males are at times very pugnacious. Many fables are connected with the Family; for instance, *Ceyx* and *Alcyone* were said to have been changed by Zeus into Kingfishers, while Aeolus, father of Alcyone, kept the weather calm in midwinter (the fourteen halcyon days), when the birds formed a floating nest upon the deep. A dried specimen, if hung up, was supposed to act as a weathercock with its bill, as Shakespeare intimates.

Sub-fam. 1. *Halcyoninae.*—*Tanysiptera sabrina* of the Moluccas, one of the members of a large and very beautiful genus, is white, except for the crown and wing-coverts, which are bright blue, and the cheeks, nape, remiges, upper back and scapulars, which are bluish-black. The two median rectrices have bluish shafts with white racquet-tips; the bill is red. *T. nympha* of New Guinea differs in its blue tail, vermilion rump and under parts. *Cittura cyanotis* of Celebes has a rufous head and chestnut tail, a brown back with partially buff scapulars, bluish-black wings with blue coverts, a blue eye-streak (black in the female), a lilac under surface, and a dark red bill. *Halcyon coromandus* of Eastern Asia is brown with a lovely lilac tinge above and a sky-blue rump, the lower parts being orange-rufous, and the bill red. *H. cyanoventris* of Java is rich blue above; the head and wing-coverts are mainly black, the lower parts ultramarine, the throat and cheeks rufous, extending as a collar to the nape; the bill is dark red. *H. semicaeruleus* of Arabia, West and East Africa, has a whitish head and under parts, with a chestnut

FIG. 80.—Racquet-tailed Kingfisher. *Tanysiptera dea.* × ½. (From *Malay Archipelago.*)

abdomen; the upper parts are black, with azure lower back, tail and wing-quills, the bill is red. *H. saurophagus* of Papuasia and the Moluccas is blue, with white head and under surface, and black bill. *H. nigrocyaneus* of the former region is black and blue, with white throat, pectoral band and dorsal markings, the bill being black. The female is whiter below. *H. lindsayi* has dingy green upper parts with buff spots, and a black eye-stripe surmounted by an azure band, both of which extend round the back of the head; the neck and throat are cinnamon divided by a blue stripe, the under parts white mottled with green; the bill is black. The blue parts are green in the female.

Dacelo gigas, the "Laughing Jackass" or "Settlers' Clock" of Australia, is mainly brown above with a white stripe on each side of the head; the tail is rufous and black, the rump of the same colour in the female, greenish-blue in the male; the lower surface is dirty white, the bill blackish. *Clytoceyx rex* of New Guinea has an immensely thick, blunt, and rather short bill; it is brown above, with a rufous collar, blackish back and neck-stripes, light azure rump, greenish tail and wing-quills; below it is light chestnut with white throat. *Carcineutes pulchellus* of the Malay countries, Sumatra, and Java has the forehead, cheeks, and collar chestnut, the crown azure, the upper parts black with blue and white bands, the under parts rufous with white throat, the bill red. The female is rufous with black bars above, and white with black spotting below. *Syma torotoro* of Papuasia is greenish, with blue tail and rump, orange-rufous head and under parts, and a black collar. The crown is black in the female. The serrated bill is yellow. The genera *Ispidina* and *Ceyx* furnish the pygmies of the Family, varying from about four to six inches in length; the coloration in the former is usually blue and black above and chestnut below, with a red bill; but *I. madagascariensis* of Madagascar is entirely rufous, except for some white on the neck and lower surface. *C. euerythra*, of the Malay countries and the Philippines, which is red with a lilac tinge above, has several similar congeners; here again, however, blue, black, and orange are not uncommon hues.

Sub-fam. 2. *Alcedininae.*—*Aleyone azurea* of Australia has dark azure-blue upper parts, reddish-orange lower surface with lighter throat, and a whitish patch on the sides of the neck. *Corythornis cristata* is ultramarine with light chestnut under

parts, the crest being green with black transverse stripes, and the bill black. *Alcedo ispida* of Britain, the whole of Europe, and the greater part of Asia, has greenish-blue upper parts, brighter blue head and tail, chestnut under parts and broad eye-streak, white throat and patches at the side of the neck, and black bill, often orange at the base. *A. beryllina* of Java and Lombok differs in being entirely greenish-blue above, and white with a blue chest-band below. *Ceryle* is the sole genus found in the New World, though it occurs also in South-East Europe, most of Asia and Africa; *C. alcyon*, the Belted Kingfisher, alone reaches the Northern United States and Canada. The half dozen large crested species are generally black and white, relieved by chestnut or grey, but *C. amazona* and its nearest allies are dull green above.

Pelargopsis gurial of India and Assam, one of the "Stork-billed Kingfishers," has a brown head, yellowish-fawn collar and under parts, dull green mantle and tail, greenish-blue lower back, and red beak.

Fam. IV. **Meropidae.**—The Bee-eaters are extremely brilliant and graceful birds, which range over the temperate and tropical portions of the Old World, being especially plentiful in the Ethiopian Region, and somewhat less so in the Indian. The Palaearctic countries possess only four species, but Celebes alone has three, one of which (*Merops ornatus*) extends through the Moluccas to Papuasia and Australia.

The bill is long and gradually curved, with a culminar ridge and deflected mandible, the maxilla being grooved and more arched in *Nyctiornis*. The short, stout metatarsus, which is weaker in *Merops*, is scutellated anteriorly and reticulated posteriorly; the abbreviated toes—rather longer in *Nyctiornis*—have slender curved claws, and are united in the case of the third and fourth to the last joint, in the second and third to a less extent. The usually short and rounded wings are long and pointed in *Merops* and *Dicrocercus*; the primaries number eleven, or ten in *Nyctiornis*, and the secondaries twelve or thirteen. The tail of twelve rectrices is even in *Melittophagus* and *Nyctiornis*, deeply forked in *Dicrocercus*, and square with two elongated and tapering median feathers in *Merops* and *Meropogon*. The furcula is U-shaped, the tongue is lanceolate, the nostrils are concealed by dense feathers in *Nyctiornis* and *Meropogon*;

the syrinx is tracheo-bronchial, the aftershaft is rudimentary; while there is no down in adults or nestlings.

The flight of Bee-eaters is rapid and Swallow-like, and they have a habit of sitting on dead branches or even upright sticks, from which they dart in pursuit of their prey, to return again promptly after the manner of Flycatchers. They skim actively over the surface of the earth, sail aloft in circles, or float with slightly upturned wings in the air; while they rest among the foliage at mid-day, and not uncommonly roost in a row on some branch at night. Occasionally they may be seen dusting themselves like Larks. *Nyctiornis* is less energetic, and loves dense forest-shades or woods of lofty trees, as does *Meropogon;* but the other forms prefer more open country, and frequent the neighbourhood of swamps or rivers, as well as arid districts. *Merops* is constantly seen in flocks, *Melittophagus* less often; *Nyctiornis,* with rare exceptions, lives singly or in pairs. The last-named sometimes will not stir even when shot at, and none of the Family are by nature shy. The note is, according to circumstances, a loud harsh whistle or a soft flute-like sound; but *Nyctiornis* utters a deep croak, ending in a churring noise, puffing out the gular plumes meanwhile and nodding the head up and down. The birds are not ordinarily noisy. It is when hawking in the air that the brilliant colours are most strikingly displayed, the snap of the bill being at such times distinctly audible; insects are also picked off the backs of cattle, and, more rarely, captured on the ground; while *Merops philippinus,* and no doubt other species, bruise their prey against their perch. The name Bee-eater is well deserved, for in Spain *Merops apiaster* is a perfect pest to the bee-keeper, catching the workers as they enter and leave the hives. The indigestible portions of the food are cast up as pellets, often found in the nest. The four to six round, glossy white eggs are deposited in holes in banks, or even in tunnels bored vertically downwards in level ground, which extend to a depth of from three to ten feet. *Merops superciliosus* and *M. nubicus* alone are said to make a slight nest of straw and feathers, the members of this genus and of *Melittophagus* often forming large colonies. The flesh is palatable, while the plumage is in great request for decorative purposes.

The sexes are similar, the young duller, with the rectrices

never much elongated; *Meropogon* and *Nyctiornis* have the gular feathers broad and lengthened into a tuft.

The Family contains five genera with some thirty-five species, varying in size from fourteen inches in *Merops natalensis* to about six and half in several forms of *Melittophagus*. *Nyctiornis amictus*, of the Malay countries, is green, with lilac forehead and crown, scarlet cheeks and throat-tuft, and a few greenish-blue plumes at the base of the bill. *Meropogon forsteri* of Celebes is also green, but has the crown, gular plumes and breast cobalt-blue, the occiput and nape brown, the abdomen dusky, and the lateral tail-feathers reddish-brown margined with green. *Merops apiaster* has ruddy-brown head, neck, upper back, and broad alar bar, buff lower back, green wings and tail with black tips to the long median rectrices, light blue upper tail-coverts, pale green and white forehead, black ear-coverts, and bright yellow throat, divided from the greenish-blue under parts by a black band. It not unfrequently visits Britain—as the Blue-tailed Bee-eater, *M. philippinus*, is said to have done once—and ranges from South Europe to Central Asia and North Africa, wintering in North-West India and South Africa. *M. viridis*, extending from Senegambia to North-East Africa and Cochin China, is yellowish-green, with a rufous tint on the hind-neck, much buff on the wing- and tail-quills, a black band washed with blue on the fore-neck, and some blue and black on the face. *M. nubicus* of the northern half of the Ethiopian Region has crimson-pink upper parts, blue-green head and throat, light blue rump and abdomen,

FIG. 81.—Bee-eater. *Merops apiaster*. × $\frac{2}{3}$.

rose-pink breast, black markings on the sides of the head, and black tips to the remiges and rectrices. *Melittophagus gularis* of West Africa is glossy black above, with bright blue on the forehead, rump, wings and median tail-feathers; the throat is crimson, the lower surface black with blue streaks; the wing-quills are for the most part rufous margined with black.

The Old World Families Bucerotidae and Upupidae are united under the latter appellation by Dr. Gadow,[1] who recognises the Sub-families *Buccrotinae* or Hornbills, *Upupinae* or Hoopoes, and *Irrisorinae* or Wood-Hoopoes; but the two aforesaid groups should decidedly be kept separate.

Fam. V. **Bucerotidae.**—The Hornbills derive their name from the immensely developed bill and casque, or helmet, found in such forms as *Buceros* (p. 395), though the excrescence in *Aceros* and some species of *Lophoceros* is rudimentary. It may be mentioned that the huge beak of the Toucans denotes no affinity to this group. The casque—open in front in *Bucorvus*—is more or less filled with cellular bony tissue, or with an almost solid mass of bony columns in *Rhinoplax;* the mandibles are occasionally serrated. The metatarsi are short, save in the terrestrial *Bucorvus*, and are rough and scaly; the toes have broad flat soles, the second and third being united for one phalanx, the third and fourth still further. The powerful wings have eleven primaries, and from ten to sixteen secondaries, while the under coverts do not perfectly cover the base of the quills. The tail has ten rectrices and is usually long, though shorter in *Bucorvus;* it is either square or graduated, and has the two median feathers much elongated in *Rhinoplax* and *Ortholophus*. The furcula is U-shaped, the tongue rudimentary; the after-shaft is wanting; there is no down on the adults or callow young; and the eyelashes are prominent, a rare feature among birds. In most forms the atlas (p. 5) fuses with the axis.

These arboreal birds, termed "Calaos" in French, frequent deep tall jungle or cultivated districts near rivers, up to five thousand feet; most, if not all, of the species descending from the trees in the morning and evening, when they have been observed bathing in streams, and digging up loose soil with their beaks. *Bucorvus* spends much of the day upon the ground searching for food. The flight, often prolonged to considerable distances, is heavy and slow,

[1] Bronn's *Thier-Reich, Aves, Syst. Theil*, pp. 233-235. The Hoopoes used once be considered Passerine.

the unwieldy body acting as a great drag, though counterbalanced by the pneumaticity, or air-containing nature of the bones, which is perhaps greater in Hornbills than in any other birds. On the wing a sound is generally produced like that of a steam-engine,

FIG. 82.—Hornbill. *Dichoceros bicornis.* Female and young. (From *Malay Archipelago.*)

possibly due to the open nature of the quills: but *Rhinoplax*, *Berenicornis*, *Anorhinus*, and *Anthracoceros malabaricus* are said to fly noiselessly. In some species the wing-action is regular; in others, rapid strokes alternate with sailing movements on outspread pinions; the head is usually drawn in and the tail depressed; while flocks proceed in single file. Individuals alight heavily, and

from their bulk are restricted to the stronger branches, along which they shuffle awkwardly, even assisting themselves with their beak.

Hornbills may be met with singly or in pairs, but ordinarily form parties of five or six, if not of larger numbers, gathering together to feed or to roost at fixed spots, which they leave before sunrise. They are not naturally shy, and if disturbed only resort to some neighbouring tree, where they may be often observed sitting on the boughs during the mid-day hours, with puffed out plumage, open bill, and head sunk upon the back as if overcome by the heat. From time to time while perched they elevate or depress the crest and utter loud yelping cries, not uncommonly flapping their wings and bowing their heads; when feeding they constantly chatter in chorus like Parrots, and vanish with shrill screams if intruders appear. The characteristic note, however, is a harsh, continuous sound, intermediate between the bray of an ass and the shriek of a railway engine; that of *Bucorvus abyssinicus* has been syllabled "hūm-hūm," and that of *B. cafer*, the "Bromvogel" of South Africa, has been said to resemble a lion's roar, and to be audible for a mile. All the species are apparently most noisy in the morning and evening, or before rain.

Fruits and insects—the latter occasionally hawked for in the air—constitute the normal food, but the larger forms devour small mammals, birds, eggs and reptiles, with grubs, flowers, and young shoots; while *Bucorvus*, which feeds chiefly upon the ground, and hops rapidly, will eat tortoises, mandioc-roots, and so forth. Berries of *Strychnos* and figs seem greatly in favour. Nearly everything is swallowed entire, with a backward jerk of the head, animals having the life beaten out of them previously, and most substances being tossed up into the air. The male has a most curious habit of casting up the lining of the gizzard with its contents enclosed, possibly to feed the female or young.[1]

A hole in a tree or a cavity at the junction of two branches serves for the nest, wherein the hen is enclosed by a plaster of dung or like material; there, under penalty of death, she remains until she emerges dirty, wasted and enfeebled, when the brood is hatched. From one to four dingy white eggs with coarse pores are deposited upon the débris or a few feathers. Contrary to expectation, observations seem to shew that the female walls herself in; but, however that may be, the cock feeds her through

[1] A. D. Bartlett, *P.Z.S.* 1869, p. 142; Flower, *tom. cit.* p. 150; Murie, *op. cit.* 1874, p. 420.

the small opening left, and is even said to knock with his bill to attract her attention as he clings to the bark. He shews great anxiety about his charge, and the hen screams and bites if molested. Various members of the Family expand the tail and inflate the throat when courting; some thrive fairly well as pets: while *Aceros nipalensis* of India, and *Dichoceros bicornis*, the Homrai, ranging thence to the Malay countries, are said to be excellent eating. The latter is sacred to Vishnu: the immured female of *Rhytidoceros subruficollis* serves as a type of virtue to the Burmese; and natives believe that the plaster for the holes is composed of gum and earth from the four quarters of the globe. In South Africa the Fingoes think that their cattle will contract disease if Hornbills are shot; Kafirs consider that drought will cease if one of them is sunk under water and drowned; Ovampos pretend that the eggs are too brittle to be handled.

Some nineteen genera may be admitted, from the Ethiopian, Indian, and Australian Regions, with about seventy species, more than thirty of which occur in each of the first two areas; a couple inhabit Celebes, and one ranges over the Moluccas and Papuasia to the Solomon Islands. None inhabit Australia.

The somewhat scanty plumage is usually black, white, and grey; but a greenish or bluish tinge, or rufous heads and lower parts are not unfrequent. Crests are present, except in *Bucorvus*; *Ceratogymna* has a gular wattle; *Berenicornis* and *Ortholophus* exhibit long upcurved loral plumes; while the orbits and throat are more or less naked, and usually of brilliant colours, these with the bill and casque being often a distinguishing mark between the sexes. The last develops gradually in the duller young.

Rhinoplax vigil of the Malay countries, termed the Helmet Hornbill, has a line down the back and the neck naked and red. The casque is yellow in front and red behind, and is much used by Eastern artists for carving and making brooches. *Berenicornis comatus*, of the same districts, has a moderate black keeled casque, and bare blue orbits and throat. The female exhibits less white. *Bycanistes buccinator* of East Africa has a large blackish furrowed casque and purple naked areas. *Lophoceros nasutus* of North-East and West Africa, has the bill and rudimentary casque black, with a yellow streak on the maxilla and several oblique yellow ridges on the mandible, the bare orbits apparently grey. In the female the bill shews red in place of black.

Ceratogymna elata of West Africa has the gular wattle, orbits, and bare throat blue, with red on the first and a median line of feathers on the last, and an abrupt, high whitish casque, which is black at the base in the male. The hen has a rufous head and neck. *Rhytidoceros plicatus* of Papuasia and the Moluccas has a reddish and white casque with obliquely overlapping plates, pale blue naked

Fig. 83.—Plait-billed Hornbill. *Rhytidoceros undulatus.* $\times \frac{1}{5} - \frac{1}{6}$. (From *Nature.*)

orbits and throat. The head and neck are chestnut in the male, black in the female. *Cranorhinus cassidix* of Celebes has a red casque, high in front and rounded posteriorly over the skull; both mandibles are yellow with red bases, and exhibit grooved plates, the bare parts being chiefly blue with a black bar on the throat.

The head and nape are chestnut and black in the respective sexes, the hen having the casque yellower. *Penelopides manillae* of the Philippines has the moderate, compressed casque transparent brown, and the naked areas white, becoming purplish in the female. *Anthracoceros coronatus* of India and Ceylon has a large yellow subcrescentic casque blotched with black, a bare white throat and blackish orbits, the latter being white in the hen. *Dichoceros bicornis* (Fig. 82) of India and the Malay countries has a large yellowish-red casque, hollowed and ending in two points anteriorly, which shews black markings in the male; the naked orbits are pinkish. *Buceros rhinoceros* of the Malay Peninsula and Indo-Malay Islands has a large red, orange, and black casque, curved up in front, and red orbits; the female having less black on the former. *Bucorvus* (*Bucoras*) has a large black casque, nearly or quite closed in *B. cafer* of South and East Africa, but open anteriorly and ridged in *B. abyssinicus* of North-East and West Africa. In the respective species the naked parts are red and blue in the male, blue and purple in the female. Some writers adopt a Sub-family *Bucorvinae* for this genus.

The fossil *Cryptornis* of the Upper Eocene of France is referred to the Hornbills.

Fam. VI. **Upupidae.**—Sub-Fam. 1. *Upupinae.*—This consists of a single genus with five similarly-coloured graceful species, which have the beak long and slightly arched, the metatarsi short and scutellated throughout, the toes rather long and the claws curved. The third and fourth digits only are joined at the base. The broad wing has ten primaries and an equal number of secondaries, the short, square tail has ten rectrices, the nestlings possess a little down. Otherwise the structure resembles that of Hornbills.

Generally found solitary or in pairs, Hoopoes stalk proudly along the ground, nodding their heads, expanding and contracting their crests, and uttering the soft reiterated "hoop" or "hoo," from which is derived their name. Besides probing the soil, the bird taps the ground with its bill or foot, and some persons think that worms are brought to the surface by the vibration; but it will also tap any perch, whether on branch, stump, or wall. The food consists of flies taken on the wing, insects generally, and worms; individuals being frequently observed climbing rocks or branches of trees in search of prey, and carefully examining heaps of refuse. Before being swallowed the larger objects are

smartly rapped on some hard surface, and most are tossed into the air. The flight is strong, undulating, and seldom protracted, though Hoopoes often escape from Hawks; they can also run rapidly. The nest, placed in holes in trees, walls, or rocks, consists of a little straw or a few twigs, with some feathers or hair; it is always, however, marked by the addition of ordure to the lining, and sites are on record in coffins or decaying bodies.[1] During incubation the cock feeds the hen, who hardly stirs from her post; the eggs number from four to seven, and are pale

Fig. 84—Hoopoe. *Upupa epops.* ×¼. (From *Natural History of Selborne.*)

greenish-blue with distinct pores. These birds are fond of dusting themselves in loose soil; the male is decidedly pugnacious, except in captivity; and the flesh is considered a delicacy in Southern Europe. Arabs venerate them and ascribe to them medicinal properties. Most persons are familiar with the story of Allah granting to Epops a golden crest, exchanged afterwards at the bird's request for one of feathers.

Upupa epops not unfrequently visits Britain, where it has nested on several occasions; it breeds from Southern Scandinavia to Northern Africa and the Atlantic Islands, migrating a little

[1] In the *Upupinae* and *Irrisorinae* the oil-gland of the incubating female, and also of the young, produces a stinking secretion.

further south; while it extends through most of Asia and reaches Japan. The fine erectile crest, the head, neck, and lower parts are cinnamon-coloured; the remaining plumage is black, varied with buff and white; a band of the latter crosses the tail; and the head plumes are tipped with black and white. *U. marginata* of Madagascar has a larger outer primary and a narrower tail-band: *U. indica*, with darker cinnamon tints, extends from India to Hainan, and intergrades with *U. epops*; *U. somalensis* of Somali-Land is intermediate between the last and *U. africana* of South Africa, which exhibits no white on the primaries or crest. Females and young are duller and less crested.

A fossil form, *Limnatornis*, occurs in the Lower French Miocene.

Sub-fam. 2. *Irrisorinae*.—The Wood-Hoopoes, differing from their allies in the longer and more decurved bill, especially noticeable in *Rhinopomastus*, the long wedge-shaped tail, and the absence of a crest, are commonly seen in flocks of from six to eight; they are shy, restless and noisy, flitting from bush to bush with undulating motion and expanded rectrices, while they also creep about probing the crannies of the highest trees—to the great detriment of the tail—or search the ground for grubs and insects generally. The note is harsh and chattering; the nest, said to be foul like that of their allies, is placed in holes in trees, the eggs being apparently white. The plumage is metallic purple, blue or greenish, with white wing-patch and tail-markings, the females and young being less bright, with shorter beaks.

Irrisor occupies the Ethiopian Region, *I. viridis* and *I. erythrorhynchus* having the head and throat bluish-green, *I. bollii* those parts buff, *I. jacksoni* nearly white. Three species of *Scoptelus* inhabit North-East and West Africa, three of *Rhinopomastus* extend from the former country and the Congo to South Africa.

The Sub-Order STRIGES, containing the natural and well-marked group of the Owls, was until lately usually treated as a mere Family situated next to the diurnal Birds of Prey (*Accipitres* of this work), whatever name or rank may have been given to the combined assemblage. Gradually, however, a conviction has arisen that these nocturnal—or chiefly nocturnal—Birds of Prey deserve a higher position than that of a Family, while Dr. Gadow, in the classification here mainly adopted, agrees with those who would separate them widely from their former associates, and places

them in close proximity to the Nightjar alliance (*Caprimulgi*), the members of which they certainly resemble in their soft plumage, large eyes, and crepuscular tendencies.

Fam. VII. **Strigidae.**—This, which contains all the Owls, may be divided into two Sub-families, (1) *Striginae* and (2) *Buboninae*.[1] In the former, or Screech-Owl section,[2] the sternum has its broad keel joined to the furcula, and exhibits no notches behind; in the latter, containing the remaining genera, the clavicles do not always form a furcula, nor do they meet the sternum, which shews one or two pairs of projections posteriorly. In this section, moreover, there is a bony loop bridging the channel in the metatarsus which contains the common extensor tendon of the toes, as is the case in the Osprey. Pterylography would lead to the same subdivisions. Between the two groups lie *Photodilus* of the Indian Region, now referred to the Buboninae, and *Heliodilus* of Madagascar, which is classed with the Striginae.

The head is large; the neck short and thin; the bill moderate in length, but stout, with a sharp hook at the tip; the culmen is usually curved, but is straighter in *Strix*, while the basal cere is more or less covered by feathering, especially in *Nyctea*. The short, strong metatarsi—somewhat longer in *Speotyto* and *Sceloglaux*—are flattened in front and covered with small scales. They are usually feathered, though in *Ketupa* and *Scotopelia* they are all but bare, while they are partly so in *Scops gymnopus* and *S. nudipes*, the two former having the toes provided with spicules below, as in *Pandion*. Many forms have the plumage extended as a thick covering of soft feathers or bristles to the claws, which are normally long, sharp, and curved, that of the middle toe having a serrated margin in the Striginae. The digits are padded beneath, and the fourth of them is reversible at will, enabling Owls to perch with either one or two toes behind. The wings are long, or fairly so, very broad, and more or less rounded, *Scops* and *Strix* being instances of greater length, *Bubo*, *Sceloglaux*, *Speotyto*, and *Photodilus* of shortness; the primaries number eleven and the secondaries from eleven to eighteen. The tail of ten or twelve rectrices is usually short and somewhat rounded, though longer in *Surnia*. The large

[1] Cf. Milne-Edwards, *Oiseaux fossiles de la France*, ii. 1871, pp. 474-492; and for further details A. Newton, *Dict. Birds*, 1894, pp. 671-674.

[2] Brisson, who divided the genus *Strix*, made the Tawny Owl its type; if this be accepted, Striginae must become Alucinae and Buboninae become Striginae.

eyes are directed obliquely forwards, but those of *Ninox* are said to have a less staring look; Owls, moreover, have little power of turning the eye-ball, and consequently add to their grotesque appearance by constantly moving the head from side to side. The upper eye-lid shuts over the eye, and not the lower, as in birds generally; the iris is extremely sensitive, contracting and expanding continually. The external ear varies in an extraordinary way, the "conch," or large shell-like aperture, often having its ample membranous margin developed into an elevated operculum or flap which stretches partially or entirely down the anterior side. In *Asio* and *Syrnium* the ear-openings are asymmetrical, those of the former reaching nearly the whole height of the skull and being directed respectively upwards and downwards; in *Nyctala* this asymmetry extends to the bones of the skull itself. The large ear is apparently correlated with a keen sense of hearing in some cases, but not in all.

The furcula, when complete, is U-shaped; the tongue is fleshy, and somewhat horny below; the nostrils, placed towards the front of the cere, are rather large, and usually concealed by bristles; the syrinx is commonly bronchial; the after-shaft is absent or rudimentary: down occurs in the adults only on the unfeathered spaces, but in the nestlings forms a woolly coating, which may be brown or dusky, as in the Snowy Owl, white as in the Screech-Owl, yellowish or grey, as in many species.

The sexes are alike, the female being larger than the male. The young resemble the adults, but, at least in certain cases, are more rufous or buff; further information is, however, needed as to the successive stages. All Owls exhibit a certain similarity, while their ample plumage creates an erroneous impression of bulk; the feathers—most compact in *Surnia*—are soft, with an admixture of hairs and with weak, brittle shafts, to which facts the noiseless flight is largely due. An erectile tuft decorates each side of the crown in *Bubo*, *Asio*, *Scops*, and *Ketupa*; but the most striking outward characteristic is the ruff of several series of small, stiff-shafted, recurved feathers, originating from a fold of the skin round the cheek, which support the larger feathers of the overlying "disc" around the eye. The latter is very complete in *Strix*, *Syrnium*, and *Asio*, being in the first-named rather triangular than circular; but in *Surnia*, *Speotyto*, *Bubo*, and *Scops*, not to mention other cases, it is far less perfect.

Syrnium cinereum, one of the largest members of the Family, is thirty inches long, though *Bubo* possesses species that are perhaps more powerful; on the other hand, *Micrathene whitneyi* and *Glaucidium cobanense* measure about five inches. Omitting the white or yellowish-white forms, the coloration of Owls may be stated to be a mixture of black, brown, rufous, grey, yellow, and white, while barring is frequent on the wings and tail. The pattern is always difficult to describe, nor can more than an indication of it be given in the space available below. Permanent rusty-red and grey phases occur in many species, or more rarely a brown phase; such species as exhibit two of these being termed dimorphic, though dichromatic would better express the meaning. The bill is blackish, dusky, or yellowish. The moult in the Strigidae appears to be very gradual.

Owls are an exceptionally cosmopolitan group of birds, a large proportion of the genera being common to both hemispheres; *Ketupa, Scotopelia, Ninox, Heteroglaux, Sceloglaux, Carine, Photodilus* and *Heliodilus* are, however, peculiar to the Old World, *Speotyto, Gymnasio* and *Mierathene* to the New. The Short-eared Owl (*Asio accipitrinus*) is found at various seasons throughout the globe, except, it would seem, in West Africa, Australia, the Moluccas, Papuasia, and Oceania; it occurs even in the Sandwich, Galápagos, and Falkland Islands. The Screech-Owl (*Strix flammea*) has an even wider range, but is not met with in Norway, the north of North America, or New Zealand. Authorities differ as to the genera and species to be recognised, but certainly many more of the latter are now known than the one hundred and ninety at which Dr. Sharpe put the total in 1875.[1]

The members of this Family frequent districts of the most varied description, whether they be wooded highlands, rocky ravines, or cultivated lowlands; the Snowy Owl (*Nyctea scandiaca*) nests chiefly on the fjelds and barren lands towards the North Pole; while the Burrowing Owl (*Speotyto cunicularia*), which is equally at home on the sandy plains of North or South America, is exceptional as an instance of gregarious habits in the group. The majority, being nocturnal, are ill at ease in sunlight, a fact which may explain the apparent discrepancy between their habitual shyness and their bold conduct at the nest or when wounded; many are then positively dangerous, and prove worse adversaries

[1] *Cat. Birds Brit. Mus.* ii. 1875, p. vii.

than Falcons or Eagles. In the perpetual day of the Arctic summer the Snowy Owl and the Hawk-Owl (*Surnia ulula*) cannot of course be nocturnal, while to a limited extent various species of *Bubo, Scops, Ninox, Glaucidium, Carine, Nyctala,* and *Asio* may be seen abroad in the hours of light; so that in many cases sight may aid in the capture of prey as much as hearing.

The noiseless flight is buoyant, but usually slow and somewhat wavering, with frequent beats of the wing; occasionally it is more direct, and in *Surnia ulula* almost Hawk-like. Owls apparently prefer to perch with the first and fourth toes behind, and on a level surface to stand with three toes in front; their gait on the ground is awkward,and being arboreal birds—with the exception of *Speotyto* and *Sceloglaux*—they rarely walk to any extent.

The food consists of small mammals, such as lemmings, rats, voles, and mice; of insects, with perhaps beetles in especial; and to a less degree of birds, reptiles, bats, worms, slugs, and snails. The stronger forms even capture young fawns, rabbits, hares, large grouse, and so forth, *Ninox connivens* being a great enemy of the young of the Koala (an Australian marsupial); while the Snowy, Mottled, Screech-, and Wood-Owls occasionally take fish, which, with crabs, constitutes the chief diet of *Ketupa*. The manner of procuring sustenance varies with the object sought. Insects are frequently caught upon the wing, but ordinarily the ground is quartered after the manner of Harriers, and a pounce made upon the prey, which is secured in the long curved talons. The smaller creatures are swallowed entire or carried in the bill; the bigger are conveyed, hanging between the feet, to some convenient spot, where they are torn to pieces and sometimes plucked. Bones, fur, feathers, beetles' elytra, and the like are ejected as round or cylindrical pellets, which commonly lie thickly around the nests or feeding-places, and clearly shew the nature of the food.

The note varies from a loud hoot to a low, muffled sound or a clear, musical cry; the utterance of both young and adults being in some cases a cat-like mew, while the Screech-Owl snores when stationary. The "hoot" is said to be produced by closing the bill, puffing out the throat, and then liberating the air, a proceeding comparable to that of the Bitterns (p. 88). On the whole the voice is mournful and monotonous, but occasionally it resembles a shrill laugh. If a nest be made, it is commonly placed in a hole in a tree or on a ledge of rock, but many species

simply deposit their eggs on the débris naturally found in cavities.

To descend to a few particulars, the Snowy and Short-eared Owls, certain other species of *Asio*, and in some cases the Eagle-Owls (*Bubo*) breed upon the ground, often near some sheltering tuft, and use little or no bedding; *Speotyto* collects a mass of grass, dry leaves, feathers, and rubbish in burrows; the Wood-Owls (*Syrnium*), the Long-eared Owl (*Asio otus*), and several other forms utilize deserted nests of Pies, Crows, Squirrels, and the like, commonly adding a fresh lining; the first-named alternatively choose holes in trees or in the ground; while *Carine glaux* has been known to breed in ant-hills. The Screech-Owl (*Strix*) and most of the smaller members of the Family deposit their eggs in crevices in rocks or banks, in natural cavities in trees, or even at the junction of two large branches; towers, lofts, dovecots, and belfries being well-known sites for the former. Apparently none of the above excavate their own holes in the wood, or do more than clear them out; a few, however, decorate the nests they usurp with green foliage, as do so many Buzzards and Eagles. The habits sometimes undergo a decided change, as when the Short-eared Owl in the Aleutian Islands, and the Screech-Owl in Texas and India take to fairly deep burrows.

The Strigidae are exceptionally early breeders; for instance, Long-eared Owls' eggs have been found in England at the end of February, and those of *Bubo virginianus* in that month in the United States; it is true the Screech-Owl is later in this country, but this does not seem to be the case with its American race. Where fresh sets are found late in the year, the first have generally been destroyed, and a second brood is uncommon, though the contrary holds true during vole- or lemming-plagues, when food is unusually abundant; at such times, moreover, the number of eggs is abnormally large for the species. The usual tale varies from two to ten, while the bigger forms as a rule do not deposit so many. Much has been made of the fact that the Screech-Owl (with the Eagle-Owl and other forms) lays at considerable intervals of time; but this is certainly not always true, and in many cases the varying size of the embryo is easily accounted for by supposing the parent to sit as soon as the first egg is deposited. On the other hand, occasional breaks certainly occur in the laying, and pairs of eggs are often produced almost simultaneously; yet the bird has

no regular habit of allowing the subsequent eggs to be hatched by the warmth of the oldest nestlings; and the reader may be reminded that in other groups, such as the Harriers and Divers, a very similar inequality in the development of the eggs may be observed. Exceptionally the white shell is said to be tinted with blue or yellow, or to be even marked with lilac and brown in *Bubo coromandus*.[1] The shape is normally oval or nearly spherical, but longer or even pointed specimens are not uncommon, while the larger the size the less glossy is the texture. The male is generally to be found near at hand if the nest is disturbed, and undoubtedly assists in some cases in incubation, which lasts about four weeks. The hen hisses when caught in a hole, and invariably sits closely; while both parents frequently remain near an intruder, and "click" their beaks at him in exactly the same manner as the pugnacious nestlings do.

Owls are constantly mobbed by other birds, especially when dazed by sunlight, the Little Owl being used as a lure on the Continent. They migrate to a greater or less extent, the autumnal visits of the Short-eared Owl being especially well-known in Britain; yet the Snowy Owl often remains in the far north in winter. The flesh is not generally reckoned palatable, but *Bubo*, *Asio*, *Nyctea*, *Carine* and *Scops* at least are eaten by the natives of various countries; superstition, however, usually prevents the murder of an Owl, which is usually supposed to entail evil, though in a few places good luck. In Andalucia the Scops- and Screech-Owls are believed to be the devil's birds, and to drink the oil from the lamps in saints' shrines; the Malagasy consider the members of the Family embodiments of the spirits of the wicked; and country folks' belief in their connection with death and the churchyard dates back at least to the time of Shakespeare, who makes one of his characters call the owl's hoot or screech a "song of death." Many species are well-adapted for aviaries, and breed freely; and the Little Owl (*Carine noctua*) has done so when liberated in Britain.

Sub-fam. 1. *Striginae.*—*Strix flammea*, the nocturnal White, Screech-, or Barn-Owl, is orange-buff above, with brown, grey and white markings, but is white below and on the complete facial discs. The dark grey phase has the white parts tinged with orange and a few distinct blackish spots beneath. The legs are entirely, and the toes partially, covered with bristly

[1] Hume, ed. Oates, *Nests and Eggs of Indian Birds*, iii. 1890, p. 103.

feathers. As mentioned above (p. 400), the bird is almost cosmopolitan, if we disregard the sub-species proposed. It is rare in northern Scotland. It lays its four to six dull white eggs, without any nest, in hollow trees, crevices in masonry or rocks, towers, belfries, lofts, and so forth, and has been known to breed in holes in banks or cliffs in America, between forking branches in the Philippines, and on the ground in Madagascar. The eggs are not uncommonly deposited at considerable intervals. The food consists chiefly of small rodents, though birds, bats, insects, and even small fish are eaten; the note is a weird screech, while young and old make a snoring noise at the nesting place. When this bird frequents dovecotes it destroys the rats which prey upon the eggs and young of pigeons, and is itself practically harmless. According to Dr. Sharpe[1] the following may also be admitted as valid species: *S. novae hollandiae* of Australia, *S. tenebricosa* of that country and New Guinea, *S. capensis* of South Africa, and *S. candida*, the Grass Owl, ranging from India to China, Formosa, North Australia, and Fiji. *S. castanops* of Tasmania may perhaps be added, and *S. aurantiaca* of New Britain is certainly distinct, but may not belong to this genus.

FIG. 85.—Screech-Owl. *Strix flammea*. $\times \frac{2}{5}$.

Heliodilus soumagnii of Madagascar is cinnamon-rufous above, with a few black spots on the head, and bars on the wing and tail; it is lighter below and pinker on the face. The toes are bare.

Sub-fam. 2. *Buboninae.*—*Photodilus badius*, found from the Eastern Himalayas to Ceylon, the Burmese Countries, Borneo,

[1] *Cat. Birds Brit. Mus.* ii. 1875, pp. 290-309.

and Java, is a somewhat similarly coloured bird to the last-named, and utters a single reiterated note. The habits are unknown.

Nyctala tengmalmi, Tengmalm's Owl, inhabits the forests of Northern and Central Europe, Siberia, and Arctic America; it has brown upper parts barred and mottled with white, and whitish lower surface banded and streaked with brown; the facial discs are fairly complete, the legs feathered to the end of the toes. Only partially nocturnal, it utters a soft whistle or bell-like note, feeds on small rodents, birds, and beetles, and lays from four to six, or exceptionally ten, eggs in holes in trees. Its only congener, *N. acadica*, called the Saw-whet Owl from its grating cry, occurs in America from Mexico northwards.

Syrnium aluco, the Tawny, Brown, or Wood-Owl of Great Britain—not found in Ireland—ranges through most of Europe and Northern Africa to Palestine, and it is said to Tibet; the colour above is grey and brown, with white spots on the wing-coverts and tip to the tail; the lower parts being rufous-white, mottled and streaked with brown. The perfect facial discs are greyish, the legs are feathered to the claws. A rufous phase is even more common in this country. It is an arboreal and entirely nocturnal species, which makes the woodlands ring with its note in the autumn gloaming, and less frequently in the morning; the sound resembling hŏo-hŏo-hŏo-hōo once or twice repeated, rather than the Shakespearean tu-whit, to-who. Surface-swimming fish vary the usual diet. From the middle of March onwards three or four large oval eggs are deposited in hollow trees or deserted nests of other birds; or even in caves, lofts, and rabbit-burrows, though trees may be near to hand; sometimes a scanty lining of twigs, grass, down, feathers, or fur is added. This genus, with about thirty species, extends over nearly the whole globe, except Madagascar and the Australian Region; some of the best known members being the northern *S. lapponicum*, the Lapp Owl, and its American race *S. cinereum*—much larger and greyer birds than *S. aluco*, with curious concentrically marked facial disks—and the whiter broadly streaked *S. uralense* of Northern and Central Europe and Siberia, which is said at times to bleat like a goat. India furnishes *S. nivicola* and *S. newarense* of the Himalayas, *S. ocellatum* and *S. indrance*, the last-named extending to the Malay Peninsula; *S. sinense* occurs in that district Burma, Cochin China and Java, *S. leptogrammicum* in Borneo.

S. nebulosum of eastern and *S. occidentale* of southern North America extend to Mexico; whence *S. virgatum, S. perspicillatum, S. albigulare* and other species range to the middle of South America. *S. rufipes* is a native of Chili and Patagonia. Finally, *S. nuchale* inhabits Western, *S. woodfordi* Southern and North-Eastern Africa.

Asio otus, the Long-eared Owl, is buff, streaked, mottled and vermiculated with brown and grey, especially on the upper parts, which appear almost brown. The buff facial discs are complete; the feathering of the legs extends more or less over the toes; the two long head-tufts are erectile. It occurs throughout Europe, in Asia ordinarily north of the Himalayas, in China, Japan, the Atlantic Islands, and North Africa, being replaced in America southwards to Mexico by the sub-species *A. americanus* (*wilsonianus*). *A. accipitrinus*, the Short-eared Owl, one of the most widely distributed of birds, inhabits or visits nearly the whole globe (p. 400). It is lighter and less streaky than the last form, with much shorter tufts. *A. mexicanus*, ranging from Mexico to Brazil, *A. madagascariensis*, peculiar to Madagascar, *A. capensis* of that island and most of Africa, which strays to Spain and Arabia, *A. stygius*, found from Mexico and Cuba to Brazil, and its Jamaican representative, *A. grammicus*, complete the genus. The last three have comparatively bare toes. The Long-eared Owl resembles the Wood-Owl in general habits, and even, it is said, breeds at times upon the earth; but it almost invariably relines deserted habitations of other birds or of squirrels with a scanty supply of twigs, grass, fur, down, or feathers, and lays from four to six oval eggs from the end of February onwards. Pies' nests are in great request, especially those of the preceding season. This somewhat silent species utters a single hoot, or else a mewing cry, often erroneously attributed to the young alone; the parents sit on the tops of trees when the nursery is disturbed, and click their beaks, just as the nestlings do. The Short-eared or Marsh-Owl makes a nest of the surrounding substances, with a few feathers, among heather, sedge, or marshy herbage, sometimes sheltered by some tussock or bush, and normally deposits from four to eight eggs; but during the vole plague on the Scottish Borders in 1890-92, when these birds abounded, they produced as many as thirteen each. In Unalashka a similar structure is made in holes in banks. Should the sitting parent be disturbed, it commonly utters a harsh scream, and hovers or circles around

with continued cries, which summon its mate, if near: at other times little noise is made, though this species is unusually diurnal. If quartering the flats for food its flight is sufficiently powerful; but if suddenly flushed it is wavering or zig-zag, as is well seen in autumn, when the bird is named "Woodcock-Owl" in Britain, from its arriving at the same time as Woodcocks.

Micrathene whitneyi, of the South-Western United States and Mexico, is grey, mottled with brown and a little rufous; the lower parts being whiter, and some white also shewing on the nape, wing-coverts, and throat. It breeds in holes in cacti and the like. The genus *Glaucidium*, or Pigmy-Owl, comprises some twenty members, distributed over most of the globe, except the Australian Region, while one inhabits Europe. The coloration is blackish- or ashy-brown, greyish, or rufous; browner and redder phases often occurring in the same species. The upper parts exhibit the usual dark mottlings, and yellowish or white markings; the under surface is lighter; a whitish collar sometimes occurs above, or a dusky gorget below. The facial discs are rather imperfect, the toes may be thickly feathered or only hairy. The habits of *G. passerinum* of Northern and Central Europe are apparently representative of these forms, which are, according to circumstances, shy or fearless, though strong and rapacious for their size; they capture birds bigger than themselves, bats, rodents, moths, and large insects generally. By preference arboreal, and denizens of hilly woodlands, gardens, and orchards, they doze in trees during the day; yet they are not entirely nocturnal, and may be seen after sunrise pursuing their prey with rapid, jerky flight, very different to that of the more slowly-flapping crepuscular species. The note varies from a loud clear whistle to a short hissing or longer gurgling sound; the three to five roundish eggs are laid in hollow trees. The largest form, *G. cuculoïdes*, found from the Himalayas to Siam, does not attain twelve inches (*G. whitelyi* of China and Japan being barely separable), while *G. cobanense* of Guatemala is only five inches long, and is the smallest Owl known. *G. radiatum* inhabits India, *G. brodiei* the Himalayas, *G. castanonotum* Ceylon, *G. sylvaticum* Sumatra, *G. castanopterum* Java, *G. pardalotum* Formosa, *G. perlatum* most of the Ethiopian Region, *G. capense* South Africa; *G. gnoma* ranges from British Columbia to Guatemala, *G. ferox* (with its races) from Texas to Bolivia and Brazil; *G. siju* occupies Cuba, *G. jardinii* New

Granada and Venezuela, *G. pumilum* Brazil, *G. nanum* Chili and Patagonia.

Sceloglaux albifacies, the Laughing Owl of New Zealand, is rufous-brown, with the middle of the feathers dark, and a few marks of white and buff above; the tail is barred with fulvous, the fairly perfect facial discs exhibit radiating brown streaks; the toes are hairy. For an Owl this peculiar species has the head small, the wings short, and the metatarsi long; it strides along or hops at a considerable rate on the ground, and flies only at night, uttering a peculiar shrill laugh or a loud barking call-note. It is fast becoming extinct in its bleak mountain-haunts, where it conceals itself by day—and also nests—in dry crevices of rocky gullies; it lays from one to three eggs at considerable intervals, if we may judge from captive specimens. The female is smaller than the male, who occasionally incubates. As the Maori rat of New Zealand is extinct, the food now consists of the introduced *Mus decumanus*, with insects, birds, and so forth.

In the genus *Ninox* the prevailing colours are grey, brown, and rufous, relieved by a little black and white, the question of dichromatism not being yet settled. The facial discs are somewhat imperfect. The thirty or more species extend from Madagascar, India, and Ceylon to Japan, Australia, New Zealand, and the Solomon Islands, having their headquarters in the Moluccas and Papuasia; but, with the exception of *Scops*, there is perhaps no group in the Family where the status of the members is more doubtful. They are sometimes termed Hairy or Hawk-Owls, though the true Hawk-Owl is *Surnia ulula*. *N. scutulata*, ranging from India to Japan, Formosa, Ternate and Flores, frequents forests and gardens, sallying forth at dusk, darting upon insects from its perch on some dead branch, uttering a reiterated double note, and laying its eggs on dried leaves in hollow trees. *N. strenua*, *N. connivens*, and *N. boobook* are Australian species, of which the first is a powerful bird with a hoarse, mournful voice, mainly nocturnal, but wakeful and speedy in the daytime. It frequents lonely forests and thick "brushes" on hills, being less widely distributed than the more diurnal *N. connivens* and *N. boobook*. The latter may be seen in sunlight capturing birds or insects in the woods, but the note of "boobook," or "buck-buck," from which it gets its native name, is only heard at night. The colonists compare the cry with "cuckoo," and believe that the

Cuckoo visits Australia and there assumes nocturnal habits. The flight is rapid and Woodcock-like, the three eggs are deposited in holes in trees, with no nest. *N.* (*Spiloglaux*) *novae zealandiae*, of New Zealand, called from its cry "More-pork,"[1] is dark brown above with white spots on the scapulars and wing-coverts, and is tawny with brown streaks below. By day it hides in trees or crevices of rocks, and appears at dusk to prey on rats, mice, birds, lepidoptera, beetles, and crickets. Besides the usual note, a shrill scream or croak is not unfrequently heard; the young make a snoring noise, and adults click the beak when angry. Two or three eggs are laid in hollow trees or under boulders. Of other species *N. maculata* is restricted to Tasmania and Norfolk Island, *N. albaria* to Lord Howe Island, *N. obscura* and *N. affinis* to the Andamans and perhaps the Nicobars, and *N. natalis* to Christmas Island, Indian Ocean; while from the Philippines and Celebes to the Solomons the numbers increase greatly, and many islands have their own peculiar forms.

Gymnoglaux nudipes of the Antilles, remarkable for its unusually bare metatarsi, is brown above and white below, with rufous barring throughout; *G. lawrencii* of Cuba having the leg-feathers less extended, and being spotted with white on the more uniform upper surface. *Speotyto cunicularia*, the Burrowing Owl, a comparatively long-legged and short-winged bird with incomplete facial discs and unfeathered toes, is umber-brown varied with yellowish and white, the lower parts becoming lighter. From the confines of British Columbia it extends through the Western and Southern United States, a few of the Antilles, and the greater part of the Neotropical Region, several fairly distinct races having been described. Large communities in North America occupy the burrows of prairie-dogs, rats, ground-squirrels, or badgers; in South America those of the biscacha, the Patagonian hare, and even of armadillos and large lizards; but they are said to make their own holes, if necessary. The homes seem usually to be shared by the separate pairs with the original owners, and sometimes with intruders such as rattlesnakes; while a nest of grass, feathers, and rubbish is made at the further end, where from five to ten eggs may be found, surrounded by castings. Mainly diurnal and generally fearless, these birds fly strongly for short distances, and procure their food of small mammals, birds, reptiles, and insects,

[1] Not to be confounded with the "More-pork" Nightjar of Tasmania (p. 417).

chiefly on the ground, where they are quite at ease. A croaking sound is made while courting, but the ordinary cry is long and shrill; both parents, moreover, fly chattering over an intruder at

Fig. 86.—Burrowing Owl. *Speotyto cunicularia*. $\times \frac{1}{2}$. (From *Nature*.)

the breeding colonies, while individuals often sit bowing or twisting their heads about on the roofs of houses.

Carine noctua, the Little Owl of British authors, is greyish-brown above with white markings, and white with brown streaks below. The facial discs are imperfect; the toes are bristly—or

feathered in the race from Northern and Central Asia (*C. plumipes* or *bactriana*). Another race (*C. glaux*), of a more sandy colour, occupies North Africa, whence the species ranges to Denmark, the Baltic and the Urals, and through Palestine and Afghanistan to East Siberia and North China. It occurs in England, where liberated specimens breed, but possibly diminish in numbers. *C. spilogastra* is found in Abyssinia, *C. superciliaris* in Madagascar, *C. brama* in India and Baluchistan. The Little Owl is semi-diurnal, and haunts wooded country and orchards; the flight in the day is undulating and slow with many flaps; the note is a muffled monosyllabic or disyllabic cry, a noisy bark, a mew, or a wail; the food consists of rodents, birds, reptiles, frogs, insects, snails, and worms. From three to five eggs are deposited on débris in crevices of rocks or masonry, in buildings, hollow trees, or even ant-hills. Of old the European form was the bird of Pallas Athene and the emblem of wisdom, but whether from its grave appearance when quiescent, or—sarcastically—from its buffoon-like contortions and bowings must remain doubtful; we may, however, compare the Malagasy name of *Scops magicus*, "atoroko," which means "I am going to say," and the similarly philosophic look that it can put on.

Surnia ulula or *funerea*, the Hawk-Owl, ranges from Scandinavia and North Russia to Kamtschatka or even Alaska, whence a race with a blacker head, and broader, redder bands below, stretches through Arctic America, and visits Britain more commonly than the typical form. This is dark brown above, freely marked with white, and white below, with distinct but narrow brown bars; the facial disks are very imperfect, the toes are feathered to the claws. The exceptionally compact and firm plumage, the short, acuminate wings, and the long tail conduce to its Hawk-like appearance, heightened still more by the quick flight, the fierce manners, and the shrill Kestrel-like cry. From their native pine-forests a few individuals wander southwards towards winter; while at home they feed on lemmings and rodents generally, Willow Grouse and other birds, and insects. They sit watching for prey on bare branches or stumps in the sunlight, occasionally dashing after a Jay or the like; not unfrequently they quarter the ground like a Harrier, and of course hunt at night also. From three to eight eggs are deposited on a few chips in hollow stumps, in boxes set up by the Lapps, or in a relined nest of some other species; the parents being perfectly fearless in their attacks on an intruder.

Nyctea scandiaca, the white Snowy Owl, occasionally exhibiting spots or broken bars of black, has ill-developed facial discs and hardly visible tufts, but very thickly feathered feet. It inhabits the circumpolar fjelds, tundras, and barren grounds, straying as far as Britain, France, Lower Austria, the Indus Valley and the Bermudas in winter; but when rodents abound on the fells of Norway and Sweden a greater number remain there to breed. The flight is strong and easy; the habits are diurnal; the food consists of lemmings, rats, mice, squirrels, hares, birds large or small, fishes, and doubtless insects. It is called Harfäng (hare-catcher) in Scandinavia. This Owl either catches the fishes in one claw as it skims over the water, or crouches on some stone or piece of ice till the moment comes to strike; at times, moreover, it will follow sportsmen in the field. The cry, seldom heard, is wild and wailing. The large, oval eggs, numbering from three to five, or even ten when food is plentiful, are deposited in holes scraped in the soil on ledges of rocks or other eminences, sometimes lined with moss and feathers; they appear occasionally to be laid in pairs at intervals. The parents, though usually wary, will attack a man at the nest.

The cosmopolitan genus *Scops*, found almost everywhere except in the extreme north, Australia, Oceania, and the southern portion of South America, contains some fifty so-called species which it would be useless to discuss in the present state of our information, though certain of them are mentioned below. Rufous, brown, and grey phases undoubtedly occur, but the various plumages are still very imperfectly understood. Perhaps two-thirds of the forms occur in the Old World, yet only one (*S. giu*) inhabits the Palaearctic Region west of Japan, though there we find *S. semitorques*. The general coloration is a mixture of grey, brown, chocolate or rufous, with a less amount of black, yellowish, and white; some species are finely vermiculated, others hardly at all, while several are almost barred below and many are distinctly banded on the tail. The facial discs are incomplete, but the head-tufts are well developed; the metatarsi and toes are feathered, or bristly, or the latter are occasionally bare. *Scops giu*, the Petit Duc of France, which visits Britain and Holland, extends over Central and Southern Europe, Asia Minor, Palestine, Persia, and Turkestan, occurring in North Africa, and migrating as far southwards as Abyssinia and Senegal. Subspecies occupy the Ethiopian Region, and Asia to Japan and

Siam; *S. brucii*, ranging from Transcaspia to India being possibly separable. The type species is grey above with the middle of the feathers dark, the back being vermiculated with brown and the wings spotted with white; the whitish lower parts are more streaky and the toes bare. It feeds by night on mice, small birds, grasshoppers, moths, and beetles; and utters a melancholy metallic single note, which rings monotonously through the woods it haunts; in the day it hides in thick cypresses and the like. Five or six roundish eggs are deposited in holes in trees, rocks, and buildings, or rarely in deserted birds' nests; no bedding being added, though the opposite is the case in some Indian species. *S. asio*, the Mottled or American Screech-Owl, reaches with its different races from Alaska and Canada to Guatemala, and is said to have a wailing cry, varied by deep guttural trills. *S. flammeola* occurs from Colorado and California to Guatemala; and thence various species carry the range to Brazil. The Ethiopian Region generally is tenanted by *S. leucotis*, the Gold Coast by *S. icterorhynchus*, Anjuan in the Comoros by *S. capnodes*, Madagascar by *S. rutilus*—though this is said to be a form of *S. magicus*, extending from Celebes to about New Guinea; the Indian Region and the Moluccas possess a large number of species, among which *S. gymnopus* of India (with half-naked metatarsi like *S. nudipes* of Veragua) may be mentioned.

Bubo ignavus, the Eagle-Owl, which visits Britain, and is the Grand Duc of the French, is blackish-brown above, with yellowish-rufous mottlings and interrupted wing- and tail-bars; it is yellowish-buff below with blackish streaks and indistinct transverse markings. The facial discs are fairly distinct, the head-tufts are long, and the toes thickly feathered. This fierce species, one of the largest of the Family, inhabits rugged mountains and forests throughout Europe, Asia north of the Himalayas to Japan, and North Africa; it is partly diurnal, and preys chiefly upon hares, rabbits, large game birds, and rodents, being said moreover to attack fawns. The flight is powerful, though undulating and flapping; the cry is a deep "hoo, hoo," occasionally sounding like a laugh or neigh. Two, or rarely three, roundish eggs are deposited in holes scraped in the soil on rocky ledges or on banks, in disused birds' nests, in hollow trees, or even between their branches or roots; little lining, if any, being added. Nearly allied forms are *B. turcomanus* of South-West Siberia and Turkestan,

B. blakistoni of Japan, and *B. dorriesi* of East Siberia ; *B. milesi* is found at Muscat, *B. abyssinieus* in Somali-Land, *B. bengalensis*—which eats reptiles and crabs—in India, *B. nipalensis* and *B. coromandus*—which occasionally lays eggs spotted with lilac and brown—in the same country and Burma, *B. orientalis* in Malacca and the Great Sunda Islands, *B. philippensis* in the Philippines. *B. lacteus* covers all the Ethiopian Region, except the west, where *B. shelleyi*, *B. lettii*, *B. leucostictus* and *B. poënsis* occur, the last being also met with in Fernando Po. *B. asealaphus* inhabits North Africa and Palestine, *B. cineraseens* North-East and *B. maculosus* South Africa, *B. capensis* extending from the South to the East. All North America is occupied by *B. virginianus*, barred instead of streaked below ; the species or sub-species *B. nigrescens* and *B. magellanieus* coming respectively from Ecuador and the districts from Peru and Brazil to the extreme south. Some forms have more white in the plumage than the British Eagle-Owl, or bare toes. All seem destructive to game and often to poultry. *B. ignavus* and *B. virginianus* have been kept in confinement in England, and the former has propagated freely.

Scotopelia peli, of West Africa and the Zambesi Region, has rufous upper parts with black bars, and fawn-coloured lower surface with the bars less regular ; it feeds on reptiles and fish as well as small animals. This fine large bird has two congeners, *S. ussheri* of Fantee and *S. bouvieri* of the Gaboon. *Ketupa ceylonensis*, a still bigger species, ranging from India and Ceylon to Hong-Kong, is buffish-brown above, with the middle of the feathers blackish, and fulvous below with dark streaks and closely set brown bands, the throat being white. *K. flavipes*, of the Himalayas and China, and the smaller *K. javanensis* of the Malay Peninsula, Siam, and the Great Sunda Islands, have no bands below ; but all have fine head-tufts and naked legs. They frequent coasts or wooded streams, where they can easily procure their main diet of fish, crabs, and insects ; they remain under cover in the day, and the last-named at least utters a soft, low whistle. The two roundish eggs, which have the surface pitted like those of the Eagle-Owl, are often laid on ledges or in recesses of rocks, in hollow trees, or at the junction of the larger branches, but more commonly a deserted nest is relined for the purpose.

Of fossil forms referred to the Family, *Necrobyas harpax* and *N. rossignoli* are described from the Eocene of France, together

with *Otus* (i.e. *Asio*) and *Bubo*; the latter genus and *Strix* occur in the Lower Miocene of the same country, *Strix* also in the Malta caverns and in the Mare aux Songes in Mauritius, *Nyctea* at Torquay and in France, *Bubo* in Wyoming, *Budiostes* in Patagonia.

The Sub-Order CAPRIMULGI consists of the Nightjar or Goat-sucker group, with the Families *Caprimulgidae*, *Podargidae*, and *Steatornithidae*, of which the latter contains only the remarkable Guácharo. The *Caprimulgidae* may be divided into the Sub-families (1) *Caprimulginae* and (2) *Nyctibiinae*. Authorities disagree as to the exact relationship of these birds to their allies, here classified as Coraciiformes; but that all are allies is certain, while both in appearance and habits Nightjars are decidedly Owl-like.

Apart from the Steatornithidae, the skull is flattened, the eyes are large, the beak is short and extremely broad, being hooked and toothed in the Nyctibiinae and occasionally decurved in the Caprimulginae and Podargidae; the gape is enormously wide, and is in many cases provided with stiff bristles, which in *Aegotheles* have long lateral filaments. An appearance of great size is given to the head by the loose plumage. The feet are fairly strong, with the digits somewhat united basally; the anteriorly scutellated metatarsi vary from comparatively long and bare in *Nyctidromus* and the Podargidae to very short and feathered in *Nyctibius*. The outer toe of the Caprimulginae has only four joints, and the mid-toe has a pectinated claw, while in the Podargidae and some Caprimulginae the hallux is partially reversible. The pointed wing has ten primaries, sometimes much elongated (p. 418), and eleven or twelve secondaries; the tail may be square, rounded, graduated, or forked, and has ten rectrices, occasionally lengthened or even racquet-tipped (*loc. cit.*). The furcula is U-shaped, the tongue short; the slit-like nostrils are basal and overhung by a membrane and feathers in *Podargus* and *Batrachostomus*, whereas they are open and near the tip of the bill in *Aegotheles*, but soft, tubular, and often elongated in the Caprimulginae. The syrinx is bronchial, sometimes tending to tracheo-bronchial; the aftershaft is rudimentary; the adults have down only on the unfeathered tracts, while the nestlings have a thick covering of it, which is generally buff or grey, but white in *Podargus* and *Batrachostomus*.

The length varies from about twenty inches in *Nyctibius* and *Podargus* to seven or eight in *Caprimulgus parvulus* and *Phalae-*

noptilus nuttalli. The characteristically soft plumage shews an intricate mixture of brown, grey, fawn, black, and white, and is ordinarily barred and minutely freckled, but frequently patched or spotted with white; it is, however, impossible in a limited space to describe the species in detail, though it may be noticed that several have reddish nuchal collars; and some exhibit rufous and grey phases —unless, as may be the case, the rufous forms are females—while others from arid districts have a protective coloration of a more or less sandy hue. In the Podargidae large powder-down patches occur laterally on the rump, in the Nyctibiinae on the breast and sides. The sexes are often alike, the young either resembling the female, or assuming the full plumage at once. *Lyncornis*, *Otophanes*, and *Batrachostomus* have head-tufts like those of some Owls, the constituent feathers in the last genus being bristle-pointed.

Nightjars are found in most parts of the world, while the northern species habitually move southwards for the winter, *Podager* and *Chordiles*, at least, flocking in August and September. The most typical forms are distinctly crepuscular, and pass the day—as our British bird does—quiescent on the soil, or upon some post or fence, often concealing themselves below shrubs or herbage, or in hollow stumps. At such times they will almost permit themselves to be trodden upon before rising from the ground, and sit with their eyes closed; on branches the body is ordinarily placed lengthwise, but on thin palings or wire this is of course impossible. *Nyctidromus* exhibits more terrestrial habits, and walks instead of shuffling; the American "Bull-bat" (*Chordiles virginianus*) hawks in the full glare of the sun. The more diurnal species frequently rise to a considerable height in the air, sailing backwards and forwards with an easy, flapping motion, descending with undulating swoops, or remaining momentarily poised aloft, and then darting suddenly upon their prey; the flight of their nocturnal allies is weaker and more lowly, being jerky, twisting, and erratic. Some forms, if not all, when inspecting an intruder turn the head almost completely round. The vibrating sound often accompanying the passage through the air may be produced by the wings coming into contact, as is the clapping noise occasionally heard; but the cause is not certainly ascertained, nor is that of the far-resounding "churr" uttered by the male of the Common Nightjar while stationary. The birds are, however, often quiet on the

wing, and steal upon the listener noiselessly with the mouth widely opened. The voice is generally hollow, but is described in various cases as a "croak," a "loud shrill cry," a "sad whistle," a "jarring note," or a "moan"; while the American Whip-poor-Will (*Antrostomus vociferus*), Chuck-Will's-widow (*A. carolinensis*), and Poor-Will (*Phalaenoptilus*), as well as the Tasmanian More-pork (*Podargus cuvieri*), are so called from the sounds they rapidly utter. The second of these is said to be silent when breeding, contrary to the habit of our Nightjar. The food consists as a rule of insects, and especially beetles, captured in the air; but the Podargidae are asserted to pick Phasmidae and Cicadidae off the trees, and even to eat fruit—as *Steatornis* does—or mice.[1]

Most Nightjars make no nest, but lay one or two white, yellowish, or pinkish eggs, beautifully marbled or scrawled with black, gray, brown, or violet, on the ground in open spots, frequently shaded by trees, ferns, or gorse. More rarely lichen-covered rocks or flat house-tops are chosen. *Phalaenoptilus* has white eggs, like those of the Podargidae, among which *Podargus* makes a flat, loose structure of twigs and grass upon some branch to contain its complement of three, and *Batrachostomus* deposits one on a peculiar pad of brown or greyish down, which is fixed to a bough and is at times based on a little bark, lichen, moss, or leaf-refuse.[2] *Aegotheles* lays from three to five in hollow trees, the parent hissing if caught upon them. Eggs of *Ae. wallacii* are stated to shew pale streaks. *Nyctibius* appears to breed in hollows of branches or stumps, and not on the ground.[3] Nightjars sit very closely, and are said to remove the contents of the nest if disturbed; the young, though hatched helpless, quickly learn to escape from danger; while the parents occasionally feign lameness to divert attention from them. The males sometimes incubate.

The superstitious of all classes are inclined to view these birds with dread, a fact due to their nocturnal habits and Owl-like aspect, coupled with their strange utterances and sudden apparitions. The Indians of Central and South America think that they portend serious evil, but refuse to kill them; while in England gamekeepers and others are only too ready to shoot them under the unfair designation of "Night-hawk."

Fam. VIII. **Caprimulgidae.**—Of this group some eighty species

[1] H. Gadow, in A. Newton's *Dict. Birds*, 1893, p. 69. [2] *J.f.O.* 1885, p. 341, pl. 4.
[3] Cf. Gosse, *Birds of Jamaica*, 1847, pp. 47, 48; Goeldi, *Ibis*, 1896, pp. 299-305.

occupy nearly the whole globe, except the coldest parts, the Eastern Pacific Islands and New Zealand.

Sub-fam. 1. *Caprimulginae.*—*Caprimulgus europaeus*, the Nightjar, Goatsucker, or Fern-Owl, visits Britain for the summer, and extends from Europe and North Africa to South Mongolia in Asia, reaching North-West India and South Africa in winter. *C. ruficollis* of South-West Europe and the neighbouring portions of Africa has once occurred in England, as has *C. aegyptius* of North-East Africa and West Asia. The genera *Heleothreptus* of Brazil and Argentina, and *Macrodipteryx* of Tropical Africa, contain respectively one and two members, remarkable for the extraordinary elongation of the remiges in the male. *H. anomalus* has the first six primaries curved inwards, the seventh, eighth,

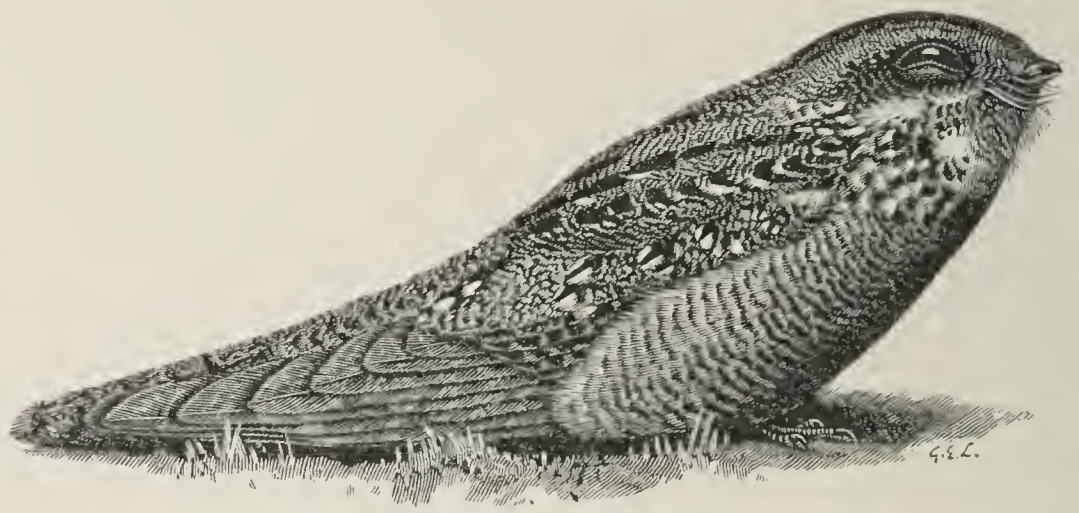

Fig. 87.—Nightjar or Goatsucker. *Caprimulgus europaeus.* × ⅓.

and ninth prolonged—especially the eighth; *M. rexillarius*, the Pennant-winged Nightjar, has the same three feathers produced, but the ninth in particular; *M. macrodipterus* has the ninth alone extended, with long bare shaft and racquet-like tip: and this is at times erected when the bird is sitting on the ground. *Scotornis climacurus* of the north of Tropical Africa, the four species of *Hydropsalis*, inhabiting South America southwards to Argentina, and the three of *Macropsalis*, ranging from Panama to Bolivia and South-East Brazil, have enormously elongated rectrices, the median pair being highly developed in the first-named, the whole number in the second, and the lateral pair in the last. These long feathers seem to impede the flight but little, though *Hydropsalis* constantly opens and shuts its tail in the air.

Sub-fam. 2. *Nyctibiinae.*—Six species of *Nyctibius* occur in Tropical America, including Jamaica, and utter wailing cries.

Fam. IX. **Podargidae.**—This group includes some five and twenty members of the genera *Podargus*, *Batrachostomus*[1] (Frog-mouth), and *Aegotheles*. The first and last occupy Papuasia, Tasmania, and Australia, the second ranges from the Himalayas to Ceylon, the Philippines, and Malay Islands.

Fam. X. **Steatornithidae.**—This contains only the curious Guácharo, or Oil-bird (*Steatornis caripensis*) discovered in 1799 by Humboldt and Bonpland at Caripé in Venezuela, but now known to breed also in Colombia, Ecuador, and Peru, as well as in Guiana and Trinidad. Somewhat intermediate between the Owls and the Nightjars, this species is about the size of a Crow, with a similar hard beak, hooked and deeply notched, while it has twelve long stiff bristles on each side of the gape. The tibiae and metatarsi are covered with smooth, flesh-coloured skin, the toes being deeply cleft, and not basally united. The tongue is thin and triangular, the nostrils have a horny covering, the after-shaft is fairly large, while the rest of the structure is mainly Caprimulgine. The acuminate and not particularly soft feathers are chocolate and grey, with darker barring above, and shew white spots, often surrounded by black, in various parts. This bird inhabits sea-side or mountain-caverns, only issuing forth at dusk to traverse considerable distances in search of its food, which consists mainly, if not wholly, of fruits. The flight is noiseless, and occasionally high in the air. Visitors to the breeding caves are suddenly surrounded by a circling crowd of Oil-birds uttering loud croaking or rasping cries, the effect being enhanced by the rush of multitudinous wings. A more plaintive note is uttered by individuals at rest. The numerous nests, each containing from two to four white or dirt-begrimed eggs, are flat circular masses of a clay-like substance, placed on ledges or in holes; while the nestlings are considered a table delicacy, though said to be scented like cockroaches. The natives systematically kill large numbers at certain seasons by knocking them down with poles when scared by torchlight, and melt out the abundant fat to procure the oil, which gives the bird its name. This oil is used for illumination or cooking, and keeps admirably.

The Sub-Order CYPSELI consists of the Families *Cypselidae* or Swifts, and *Trochilidae* or Humming-birds,[2] which were first

[1] Cf. the French "Crapaud-volant" or Flying Frog, applied to Nightjars.

[2] The *Cypselomorphae* of Huxley included Swifts, Humming-birds, and the Nightjar group.

grouped together by Nitzsch as *Macrochires* (long-handed forms) from the length of their manual bones, though really the parts of the wing nearer the body are proportionally most elongated.

Swifts certainly differ from Humming-birds in the broad, flat skull, the short curved bill, and the extremely wide gape, besides their comparatively sombre coloration; but these facts cannot be allowed to militate against an alliance so strongly confirmed by many points of structure, while nothing but the pardonable ignorance of former times caused the Family to be united with their Passerine analogues, the Swallows. The *Cypselidae* agree with the *Trochilidae* in the number and colour of their eggs, and the extraordinarily deep keel of the sternum, which, with the long wings, gives so great a power of flight.

Fam. XI. **Cypselidae.**—Of this group three Sub-families may be recognised, (1) *Macropteryginae*, (2) *Chaeturinae*, and (3) *Cypselinae*.

The short but robust metatarsi are scutellated anteriorly, the scales being nearly obsolete in the Chaeturinae; fairly powerful claws terminate the free toes, which are all directed forwards in the Cypselinae, though the hallux is somewhat laterally inclined in *Panyptila*, and is said to be occasionally versatile in the other Sub-families. The middle and outer digits in the Cypselinae have the further peculiarity of possessing only three joints, while the metatarsi or even the toes are feathered. The ten primaries, and especially the exterior, are extremely long, with thick narrow outer webs; the short secondaries vary from six to eight. The square or forked tail has ten rectrices—not uncommonly rigid and pointed—as against twelve in Swallows. The furcula is U-shaped; the tongue sagittate; the syrinx tracheo-bronchial (the muscles not being inserted on the bronchial rings); the aftershaft is large or small; the adults have a little blackish down on the unfeathered spaces; the nestlings are blind and naked.

The coloration is usually greenish-black or mouse-brown, occasionally with a white chin, breast, or rump; a rufous collar or chestnut ear-coverts occur in *Macropteryx* and *Cypseloïdes*, where alone the males differ from the females, and the young from both. The Family ranges over the whole world, with the exception of the extreme north and south, New Zealand and some other islands; the six genera containing about eighty species varying in size from about four to fourteen inches.

Swifts are essentially aërial, seldom alighting upon the ground, or perching except at night,[1] though they will cling to the entrance of their breeding quarters for a few seconds before entering. From a smooth flat surface they can hardly rise, but in the air they are perfectly at home, whether wheeling and circling at great altitudes, chasing each other aloft, consummating their love affairs, or sweeping over the earth's surface in pursuit of insects attracted by the damp. The exceptionally rapid flight is strong and practically unlimited in duration, two or three quick movements of the wings being repeatedly succeeded by a gliding motion. Though not gregarious in the ordinary sense, they habitually breed in company, and *Collocalia* nests in vast colonies; a solitary bird, moreover, is comparatively seldom seen, and both before and during incubation our Common Swift flies in screaming flocks around the chosen sites. This species will pass and re-pass close to a pedestrian's head with noisy and apparently vicious rush, even when far from the nest; yet it is not really the intruder but insects that are the attraction, the food being entirely of that nature, and invariably captured in the air, while the beak may be seen filled to repletion when nestlings require to be supported. The voice is a shrill scream, constantly repeated. The districts frequented are of every description, *Cypselus andicola* and *C. horus* being particularly alpine; the nest varies to a considerable extent, though a glutinous substance secreted by the highly developed salivary glands is a constant, or frequently almost the sole, material. The situation may be a hole under thatch, slates or tiles; a crevice in a building, cliff, or tree; the perpendicular wall of a cave; the upper side of a branch, palm-leaf, or broad stalk; the lower surface of a rock, and so forth. The shape of the structure is tubular in *Panyptila*, where it is composed of seeds of plants; but generally it is saucer-like, the materials being straw, feathers, twigs, moss, or cottony vegetable matter, the first two of which have been stated to be caught floating in the air. The American Chimney-Swift plucks off branchlets as it flies. *Cypselus affinis* and the species of *Collocalia* commonly join their nests together in masses; Palm Swifts do so more rarely; *Cypselus caffer* even utilizes those of other birds. The dull white eggs are oval and almost uniform at each end;

[1] D'Albertis noticed *Macropteryx mystacea* settling on trees in the day-time, and Shufeldt saw *Cypselus melanoleucus* sitting on rocky pinnacles.

two or four being the usual complement, though three are exceptionally found, and *Macropteryx* lays only one.

Sub-fam. 1. *Macropterygiuae.*—The Tree-Swifts, as they are called, have very soft plumage, a long, deeply-forked tail, a patch of downy feathers on the flanks, and elongated plumage on the top or sides of the head. They range from India and Ceylon through the Burmese and Malay countries, and the islands thence to the Solomon Group. *Macropteryx coronata* of India, Ceylon, Burma, and Siam has bluish ash-coloured upper parts, glossed with metallic green, especially on the crested head, wings, and tail; the under surface is greyish and white, the chin and ear-coverts are rufous. The female lacks the chestnut. The nest is a half saucer of bits of bark and feathers, gummed by saliva to a branch some twenty feet from the ground, trees being usually selected in rough jungle on low hills. It contains one egg, and is so small that the sitting bird quite conceals it. Other species are *M. longipennis, M. wallacii, M. comata,* and the larger and most eastern *M. mystacea.*

Sub-fam. 2. *Chacturinae.*—Of the three genera, *Chaetura, Cypseloïdes,* and *Collocalia,* the first occurs from Central Asia and India to Japan, New Guinea and Australia; in Tropical Africa; and in the Nearctic and Neotropical Regions, except the extreme north and south. All the species, numbering about fifty, have rigid tail-feathers with more or less projecting spiny shafts, save in *Collocalia.*

Chactura caudacuta, which has strayed to Britain and New Zealand, ranges from Mongolia and Japan to China and the Eastern Himalayas, wintering southwards to Australia and Tasmania. It is dusky-brown with greenish-black head, wings, and tail, white forehead and breast. The nest, placed on cliffs or in hollow trees, is probably similar to that of the next species, several pairs nidificating together. *C. pelagica,* the "Chimney Swallow" of the United States, chiefly found in the east, but extending to the Fur Countries and the Great Plains, and in winter at least to Mexico and Yucatan, is dark grey, with lighter lower surface, blackish head and wings. It has almost ceased to breed in trees, but fastens its semicircular nest of small twigs, glued together with salivary secretion, to the inside of chimneys, laying from four to six white eggs. *C. zonaris,* extending from the West Indies and Mexico to Argentina, is uniform blackish-brown with white collar and breast; *C. novae guineae* of Papua is glossy greenish-blue above, and grey below, with an excep-

tionally short tail: *C. ussheri* of the Gold Coast is dark brown, varied with a good deal of white; *C. cassini* of the Congo and Gaboon, and *C. bochmi* of East Equatorial Africa, are glossy black with less white. *C. acuta* of the West Indies, *C. grandidieri* of Madagascar, and other forms, complete the genus.

In *Cypseloïdes* the shafts of the rectrices scarcely project perceptibly; while the tail is emarginate in *C. niger* of western North America, the Antilles, and Guiana. The coloration is plain black or brown, with a reddish collar round the neck in the males of *C. rutilus* and *C. brunneitorques*. The genus ranges to Peru and Brazil. The nest, placed in holes in houses and so forth, is made of straw, leaves, and rubbish; the eggs are four or five.

Collocalia is an especially interesting section of the Family, on account of the nests furnishing the birds'-nest soup of the Chinese. Being formed of the dried secretions of the salivary glands,[1] these are almost entirely glutinous, and when newly built are termed "white" or "first quality." The thirteen diminutive species are black or brown above, occasionally with a blue gloss, and white on the rump or tail: the under parts being whitish or grey. They are not migratory, but extend over most of the Indian and Australian regions, except the northernmost portions, being found as far south as North Australia. One form reaches the Mascarene Islands. Huge numbers breed in company in dark caves, sticking their nests close together upon the rocky walls, or even joining them in masses; the materials may include moss, straw, lichen, and so forth, but inspissated saliva is the chief, and often the only, constituent, especially in *C. fuciphaga*. "Brown nests" are those discoloured by use, or spoilt by an admixture of foreign substances, and are considered hardly worth collecting. Two eggs are the usual complement. The caverns are entered from boats below, or by ladders from above, other ladders or poles notched for the feet being fixed in the rocky flooring of the interior. These are ascended by natives armed with long-pronged forks, who obtain hundreds of nests at one gathering. Bats occupy the caves by day, the birds by night or when incubating: while at any time the noise of the escaping denizens is almost deafening. The breeding sites are a very lucrative property. The especially valuable *C. fuciphaga*, which obtained its specific name from the erroneous idea that it built

[1] Green, *J. Physiol.* vi. 1885, pp. 41-45.

with partly digested sea-weed, extends (if we include several more or less distinct races) from the Duke of York Island and the Ladrones in the east to the hills of India, Ceylon, and the Mascarene Group in the west, a small species of slightly more eastern range with whitish band on the rump being known as *C. franeica.*

Sub-fam. 3. *Cypselinae.*—This contains only the genera *Panyptila* and *Cypselus,* granted that the latter is not further divided. The former has feathered toes, a deeply forked tail with pointed outer feathers, and soft, silky black plumage, varied with white. The very remarkable architecture of *P. saneti hieronymi* of Guatemala is described as follows by Mr. Salvin :[1] "The nest of this species is composed entirely of the seeds of a plant, secured together and hung from the under surface of an overhanging rock by the saliva of the bird. The whole structure measures 2 feet 2 inches in length, and is about 6 inches in diameter. The entrance is at the [lower] end, and the hollow for the eggs at the top." The cavity in the above case was in the shape of a walking-stick, with its knob bent laterally at the top, while a false entrance shewed at one side. *P. cayennensis,* ranging from Nicaragua to Brazil, makes a similar nest on trees.

The coloration of the twenty or more species of *Cypselus* is sooty-black or mouse-brown, frequently exhibiting a metallic gloss, while the collar, rump, abdomen, or edges of the feathers may be white. A forked tail is not uncommon, and the strong toes are feathered in *C. melanoleucus* and *C. squamatus. C. apus,* the Common Swift or Deviling of Britain, is found through Europe, North Africa, and Asia southward to the Himalayas, migrating to South Africa, Madagascar, and Southern Asia. A paler race (*C. pallidus* or *murinus*) extends from the Atlantic Islands and the Mediterranean basin to Bogos Land and Sind. The habits are well-known; but it may be observed that in flying the wings take the form of a bent bow, and that on the Continent it builds in hollow trees instead of in holes under eaves, in walls or cliffs. Few individuals remain with us after early September. *C. unicolor* is peculiar to Madeira, the Canaries, and the Cape Verd Islands; *C. affinis* reaches from Africa and Palestine to India; *C. melba,* the "Alpine Swift," inhabits the same Asiatic countries, extending westward to South Europe and North Africa, and wandering north to Britain and Heligoland. *C. caffer* occurs in South

[1] *P.Z.S.* 1863, pp. 191-192.

Africa, Abyssinia, and Uganda, and exceptionally on the Congo; *C. horus* across Tropical Africa; *C. andicola* in Argentina, Peru, and Bolivia; *C. montivagus* in the last two countries. *C. pacificus* of East Asia, with Japan and the Burmese countries, reaches Australia in winter. Some species lay four or five eggs, and

FIG. 88.—Swift. *Cypselus apus.* $\times \frac{1}{3}$. (From *Natural History of Selborne.*)

C. melanoleucus of western North America utters a peculiar twitter in its nest, placed in clefts of rocks.[1] Five species of *Tachornis*, or Palm-Swift, here included under *Cypselus*, are found throughout the Ethiopian Region, from India and the Malay countries to China, and in the West Indies; *T.* (*Claudia*) *squamata* occupying Guiana, Brazil, and East Peru. The toes point forward in two pairs, the tail is forked. These birds usually attach their nests

[1] Two large ticks (*Anapera fimbriata*) are usually found on this bird, similar to *Anapera pallida* of *C. apus.*

of cottony down and feathers to the leaves or spathes of palms with their saliva, but also breed on native huts.

Fossils referred to *Cypselus* and *Collocalia* occur in the Lower Miocene of France, while *Aegialornis* of the Eocene (p. 315) is placed here by M. Milne-Edwards and re-named *Tachyornis*.

Fam. XII. The **Trochilidae**, or Humming-birds, so called from the sound often made by the vibrating wings, are New World forms noted for their grace and beauty. The English name dates back to at least 1632, while one species from Hispaniola is mentioned as "paxaro mosquito" by Oviedo in his *Hystoria general de las Indias*, as early as 1525. This appellation still remains as the French "Oiseau-mouche," that of *Trochilus* having been borrowed from Pliny by Barrère, who believed Humming-birds to be allied to the Wren, the *Trochilus* in part of the Latin author. Τροχίλος, however, was applied by the Greeks to the smaller Plovers (p. 295), and apparently ὄρχιλος to the Wren, so that Pliny or his copyists originated a chain of errors. From native sources we have the names Guainumbi, Ourissia, and Colibri, from the Spanish "Picaflor" and Tominejo (atom); from Mexico "Chupa-rosa" and "Chupa-myrta" (Rose-sucker and Myrtle-sucker); from the West Indies "Murmures" and "Bourdons."[1]

The sternum is enormously developed both in length and depth of keel, thus furnishing a wide base for the attachment of the particularly strong wing-muscles, which support the untiring flight. Herein Humming-birds resemble Swifts, but the head is much more compressed, and the bill is slender and elongated, except in nestlings; they are in fact the longest billed members of the Class *Aves* in proportion to their size, which in this Family reaches the minimum. Both mandibles may be serrated, and the maxilla is hooked in *Androdon* and *Rhamphodon;* but for details of the variable beak, remiges and rectrices, reference must be made to the species described below. The metatarsus, feathered in such genera as *Eriocnemis* and *Loddigesia*, is short; the toes being usually diminutive, but sometimes stronger, and the claws either small and rounded, or elongated, curved, and sharp. The ten primaries, of which the outermost is the longest, except in *Aithurus* —where it is shorter than the next—are frequently rigid; in the male "Sabre-wings" (p. 435) the shafts of two or three are extraordinarily dilated and curved; while the tenth is occasionally

[1] For a fuller account, see A. Newton, *Dict. Birds*, 1893, pp. 440-451.

filiform at the tip or narrowed throughout. The secondaries are only six, or rarely seven. The tail of ten feathers may be long or short, but differs profoundly in shape, texture, and colour; being for example cuneate in *Phaëthornis* and *Sphenoproctus*, nearly square in *Urosticte* and *Hylocharis*, rounded in *Adelomyia* and *Polytmus*, deeply forked in *Sappho*, *Lesbia*, and the four genera next named, of which *Prymnacantha* has the outer pair of rectrices very narrow and pointed, *Loddigesia*, *Spathura*, and *Discura* spatulate.

The very characteristic tongue consists of a double tube, tapering and separating into two externally lacerated sheaths at the tip, which contain the extensile portion. The "horns" of the hyoid apparatus are greatly elongated, and pass round and over the back of the head, meeting near the top, and thence stretching in an ample groove to terminate in front of the eyes. This arrangement, analogous to that found in Woodpeckers, allows the tongue to be suddenly protruded to a considerable distance, and withdrawn again in an instant. The furcula is U-shaped; the syrinx has one or two pairs of tracheo-bronchial muscles; the aftershaft is very small; a crop is present; while down is absent from both nestlings and adults.

Except in the "Hermits" (p. 435), the brilliant coloration almost defies description, the most exquisite metallic[1] or jewel-like hues glorifying a background of green, blue, or brown; while crests, ear-tufts, neck-frills, and pendent beards ending in points or forks, add to the effect. Only among the Passerine Sun-birds (Nectariniidae) of the Indian and Ethiopian Regions can a fitting parallel be found; but these, though often erroneously termed Humming-birds, have no connexion with our New World group. *Eulampis* and *Pterophanes* are exceptional in not having dusky remiges. The females are usually sombre in comparison, and lack the ornaments of their consorts, which are said to be occasionally smaller. The statement that young males have no distinctive plumage seems incorrect.

These gems of Ornithology extend from the north to the extreme south of America, the habits differing slightly with the climate; *Selasphorus rufus* of the Western United States reaches Mt. St. Elias in Alaska, *Trochilus colubris* occurs in the east up to lat. 57° N., *Eustephanus galeritus* frequents Tierra del Fuego

[1] These are produced by the prismatic surfaces of the feathers, cf. pp. 3, 4.

even in snowy weather, while *Oreotrochilus chimborazo* and *O. pichincha* brave the storms of the volcanic regions of the Andes of Ecuador, close to the perpetual snow at a height of sixteen thousand feet. The forms found in the furthest north and south are few, and draw towards the equator at the cold time of year; while the successional flowering of insect-attracting plants, and the seasonal alteration of the snow-line, cause latitudinal or altitudinal movements of the same nature. Only eighteen species are recognised as occurring north of Mexico by New World ornithologists, but many more inhabit Central America, which are either peculiar to that region and even its elevated tablelands, or range into South America; none, however, being migrants in the strict sense of the word. The headquarters of the Family lie in Colombia and Guiana, though Venezuela, Peru, Bolivia, and Brazil claim many, and some of the finest, forms: on the other hand, the dry Peruvian plains and the Argentine Pampas lack sufficient insect-food to be favourite residences. With regard to the West Indies the numbers increase from the Bahamas to Trinidad, each island often having its own species; *Eustephanus galeritus*, *E. fernandensis* and *E. leyboldi* occupy the Juan Fernandez group, and the first-named Chili and the Straits of Magellan also. Humming-birds may be roughly divided as alpine, subalpine, and lowland, while it may be noticed that comparatively few inhabit the great forest-clad delta of the Amazon, the congenial centre of so much bird-life.

The Trochilidae live almost entirely in the air, and fly powerfully, though seldom to great distances; they will flit from flower to flower for hours, darting off to each new blossom with arrow-like speed, and remaining suspended before it, with the body vertical and the wings in a state of tremulous motion, while probing the inmost recesses. This is commonly accompanied by a vibratory movement of the tail, which in some cases opens and shuts like a fan. The humming sound, produced at each new departure or change of course, and audible for several yards, is due to a pulsation of the wings, so rapid that little can be seen of the bird but an indistinct misty outline. Messrs. A. and E. Newton give the following charming account of *Eulampis holosericeus*[1]:—"One is admiring the clustering stars of a Scarlet *Cordia*, the snowy cornucopias of a *Portlandia*, or some other

[1] *Ibis*, 1859, pp. 139, 140.

brilliant and beautiful flower, when between the blossom and one's eye suddenly appears a small dark object, suspended as it were between four short black threads meeting each other in a cross. For an instant it shows in front of the flower; an instant more, it steadies itself, and one perceives the space between each pair of threads occupied by a grey film; again another instant, and emitting a momentary flash of emerald and sapphire light it is vanishing, lessening in the distance, as it shoots away, to a speck that the eye cannot take note of,—and all this so rapidly that the word on one's lips is still unspoken, scarcely the thought in one's mind changed. It was a bold man or an ignorant one who first ventured to depict Humming-birds flying; but it cannot be denied that representations of them in that attitude are often of special use to the ornithologist. The peculiar action of this, and probably many or all other species of the Family, is such, that at times, in flying, it makes the wings almost meet both in front and behind at each vibration. Thus, when a bird chances to enter a room, it will generally go buzzing along the cornice; standing beneath where it is, one will find that the axis of the body is vertical, and each wing is describing a nearly perfect semicircle. As might be expected, the pectoral muscles are very large, indeed the sternum of this bird is a good deal bigger than that of the common Chimney Swallow (*Hirundo rustica*, L.). But the extraordinary rapidity with which the vibrations are effected seems to be chiefly caused by these powerful muscles acting on the very short wing-bones, which are not half the length of the same parts in the Swallow; and accordingly, great as this alar action is, and in spite of the contrary opinion entertained by Mr. Gosse (*Nat. Sojourn in Jamaica*, 240), it is yet sometimes wanting in power, owing, doubtless, to the disadvantageous leverage thus obtained; and the old authors must be credited who speak of cobwebs catching Humming-birds."

FIG. 89.—Humming-bird. *Eulampis jugularis*. $\times \frac{2}{3}$.

Darwin[1] writes of *Patagona gigas*: "Like others of the genus, it moves from place to place, with a rapidity which may be compared to that of *Syrphus* among diptera and *Sphinx* [especially the Humming-bird Sphinx (*Macroglossa stellatarum*)] among moths, but whilst hovering over a flower, it flaps its wings with a very slow and powerful movement, totally different from that vibratory one, common to most of the species, which produces the humming noise." This slower movement has been observed also in *Pterophanes temmincki*, and no doubt in other large forms, of which the aerial course is perhaps more zigzag and jerky than elsewhere. Certain species habitually sit with puffed out plumage and somewhat elevated bills; others soar, or skim the surface of water like Bats; the tail-feathers, moreover, are often moved sideways or twisted during flight, especially when they are elongated or spatulate; and *Loddigesia* constantly extends them perpendicularly to the body, if not further forward, though the racquet-tips may at other times be almost in contact.

The food consists almost entirely of insects, while the alimentary canal shews but little trace of honey, which the birds nevertheless seem to enjoy, when swallowed with the creatures which it allures; and as these appear on the lips of flowers chiefly after wet, or in the morning and evening, their feathered foes are naturally then most active. Cacti, alstroemeriae, orchids, and composites seem particularly attractive, and tubular blossoms to the long-billed species especially. Those with shorter beaks, being unable to penetrate the deepest tubes, are said to pierce the hinder portions, while it is asserted that those with extremely curved mandibles even make use of a twofold process, first inserting the tips, and then raising themselves slightly so as to penetrate the recesses. *Rhamphodon, Phaëthornis, Eutoxeres*, and *Chlorostilbon* examine the crevices of trees and walls for spiders, which they habitually eat; while the "Hermits," balanced in the air, pass the bill carefully though quickly over the lower surface of leaves in search of insect-diet. *Oreotrochilus pichincha* has been observed clinging to rocks and feeding upon the ground; *Aithurus, Petasophora, Pygmornis, Lampornis, Patagona* and other species, take up posts on dead branches or twigs, thence darting upon their prey in Fly-catcher-like style. Gould once managed to reach the shores of England with two examples, kept alive on sweetened water and yolk of egg.

[1] *Zool. Voy. Beagle*, iii. 1841, p. 112.

The males are extraordinarily pugnacious, and one will furiously set upon another who interferes in the least with his comfort, the pair circling around with reiterated, high-pitched notes, attacking and withdrawing in turn, almost heedless of a fall or collision; finally, beak grasps beak, and the struggle grows more intense, until the defeated combatant retreats to some friendly tree, only to renew the fight with vigour unimpaired should his defiant note exasperate his rival beyond control. Or again, should a prowling hawk, an inoffensive heron or thrush, or even a human being, pass perilously near a nest, the cock will make a determined onslaught, often with complete success; the hen following his example, if she feels called upon to protect her charge. These tiny creatures seem absolutely fearless, and frequently feed at once from the hand when caught.

The twittering voice is variously described as a chirp, a squeak, a querulous warble, a whistle, a loud clear piping cry, or a shrill screech, while the absence of proper song-muscles makes it difficult to credit Gosse's statement that *Mellisuga minima* utters a weak, sweet warble, lasting for ten minutes.[1]

The nest is usually a moderately deep, round or oval cup-like structure, which may be no larger than a walnut-shell: this is formed of the cottony down of plants, moss, wool, or like materials, felted into an extremely light and spongy mass, and often decorated externally with lichens, cobwebs, shreds of bark, or even feathers and dry leaves. It is placed in a small fork, saddled upon a bough, hung from creepers, laced among branchlets, or exceptionally fastened to thatch. In *Rhamphodon*, *Phaëthornis*, *Cephalolepis*, *Heliothrix*, and possibly elsewhere, a fabric of very delicate twigs, fibres, and bark is attached to the lower part of a palm or similar leaf, several rings of supporting fibre encircling the portion near the stalk, and spiders' webs or silky threads aiding to sustain the sides of the structure, which in depth and make recalls that of the Reed-Warbler. *Oreotrochilus* forms a peculiar "hammock" of moss, grass, and so forth, attached by like contrivances to rocks; or at times suspends a mass of wool, hair, moss, and feathers, as large as a child's head, with a small depression above for the eggs, from pendent roots, tendrils, or creepers. This is said to be weighted on either side, if necessary, with small stones or morsels of earth, and is repaired for use in

[1] *Birds of Jamaica*, 1847, p. 130.

successive years. Humming-birds never lay more than two eggs, and sometimes only one; these are plain dull white, and similarly shaped at both ends. The young are hatched blind and naked, and are then about the size of humble bees: but they leave the nest comparatively soon, and are precocious as regards flight. The duration of incubation, which is apparently not shared by the male, is variously stated at ten, twelve, or even more days, and two broods are said to be reared in a season; the first point is clearly doubtful; but, considering the extent of the season fit for nidification, the latter is not improbable. The parents have been known to add to a nest, as the young outgrew it. The cock courts the hen most assiduously, circling around her with dilated throat and swelling plumage, and searching for food to offer, while he carefully watches over her when sitting. Humming-birds have been often said to be killed with water in place of lead, but in truth diminutive pellets of the latter are used, as an alternative to the blow-pipe with its clay ball, or to bird-lime. Immense quantities are exported for decorative purposes, and the Mexicans make pictures of the feathers.

The late Mr. Salvin, who divided the Family into groups by the serration of the beak,[1] recognised a hundred and twenty-seven genera with some five hundred species, while Audubon, Bates, Gosse, Gould, Mulsant, Wilson and Waterton, Count Berlepsch, Messrs. Elliot, Hartert, Ridgway, and Wallace may be mentioned among other "Trochilidists." The largest form, *Patagona gigas*, measures nearly nine inches, *Mellisuga minima* and others about two and a half.

(1) Forms with distinctly serrated beaks. *Heliothrix* of Central and South America southward to Brazil contains three members with wedge-shaped bills and blue tufts behind the ears. The females differ little from the males in colour, but have longer tails. *Augastes* contains the two "Vizor-bearers" of South-East Brazil, so-called from the appearance of the head and throat; *A. lumachellus* is bronzy green, with a very brilliant green throat terminated by a red line, a little blue shewing between these two colours; the crown is velvety black, the pectoral band white, the tail bright bronzy-red. The female is less highly coloured and has a green head. *Rhamphodon naevius* of the same country, and *Androdon aequatorialis* of Colombia and Ecuador, have the bill strongly hooked; the latter is brownish-

[1] *Cat. Birds Brit. Mus.* xvi. 1892, p. 28.

green above and greyish below, with a blue nape and white rump-bar. *Chlorostilbon*, ranging from Mexico to Argentina, possesses some dozen green species with blue or purplish tails, which are forked or rounded; *Panychlora* of Colombia and Venezuela is similar; *Sporadinus*, differing in its bronzy-black rectrices, inhabits Florida, the Bahamas, and the greater Antilles. In *Aithurus polytmus*, peculiar to Jamaica, the two tail-feathers next to the outer pair are immensely elongated, and, after crossing one another, bend outwards in a curve; the lateral rectrices are bluish-black, as is the head with its divided crest; all the other parts being luminous green, and the bill red with black tip. The female is chiefly green above and white below, with brownish crown. The two species of *Microchera* of Panama, Costa Rica, and Nicaragua, change with the light from coppery-red to black, and have a greenish throat, a white crown, and a partly white tail, except the median feathers. The hen is green above and white below. *Lampornis*, with about ten species, ranges from South Mexico and the West Indies to Brazil. *L. violicauda*, the South American "Mango," is green with velvety black abdomen and throat, the latter being edged with blue; the lateral rectrices are violet. *Avocettula recurvirostris* of Guiana, with its golden green coloration, emerald breast, and tail fiery red beneath in the male, has an upturned tip to the bill, recalling that of the Avocet. The female is chiefly white below. *Eulampis holosericeus*, extending from Barbados to St. Thomas, is golden-green,

FIG. 90.—Long-tailed Humming-bird.
Aithurus polytmus. × ½.

with glittering blue tail-coverts and chest; the rectrices are steel-blue, the wings and abdomen blackish. *E. jugularis*, of the Windward Islands, has green wings and red throat. *Petasophora* contains some seven members, ranging from South Mexico to Bolivia and Brazil, with fine blue or purple ear-tufts, which occasionally meet in front. *Chrysolampis mosquitus*, extending from New Granada to Guiana and Brazil, with Trinidad, is often called the Ruby-and-Topaz Humming-bird, from its ruby-red head and nape, and topaz-orange throat and breast; the upper surface is velvety brown, the tail chestnut, the abdomen olive. The plumage of the male is largely used for decoration; but the female is chiefly dull bronzy-green with whitish lower parts.

(2) Forms with feebly serrated beaks. The large musky-scented *Pterophanes temmincki*, of the Andes from Colombia to Bolivia, is dark green, with the whole wing blue above and below, except for its black tip. The hen-bird is rufous beneath and has purplish-black remiges. *Diphlogaena iris*, the lovely fork-tailed "Rainbow," has a golden-green forehead, an orange-scarlet crown with a rich violet-blue median stripe, a black nape, a lustrous lilac throat-spot, a chestnut rump-region, tail and abdomen, and green plumage elsewhere. The female has little or no copper or blue tints. This species inhabits the Andes from Ecuador to Bolivia, and has two similar congeners. *Cyanolesbia gorgo* of Colombia and Venezuela is green, with the throat sapphire-blue and the tail violet-blue in the male, these parts being white and nearly green respectively in the hen, which has the under parts chestnut. *Sappho*, of Peru, Bolivia, Chili, and Argentina, includes two exceptionally lovely birds with long forked tails and luminous throats. *S. sparganura*, the "Sappho Comet," is bronzy-green with crimson back and fiery orange rectrices, which are black at the tip and brown at the base. *S. phaon* has both the above parts lustrous crimson. The females have short tails and lack the red back. The four members of *Lesbia*, another genus with a long forked tail, occupy the Andes from Colombia and Venezuela to Bolivia; *L. victoriae*, the "Train-bearer" of Bogota, being golden green with glittering throat and purplish-black tail tipped with green; the hen is green and white below, and has the narrow rectrices shorter. *Metallura*, with about nine species, is found in the same countries. *Eustephanus galeritus* of Chili, the Straits of Magellan,

and Juan Fernandez, which haunts damp shady spots, is bronzy-green, with fiery red crown, and greyish-white under parts spotted with green. The female has the crown green. *E. fernandensis* inhabits Juan Fernandez, and *E. leyboldi* Masafuera. *Panterpe insignis* of Costa Rica is bluish-green, with glittering blue crown and breast, blue-black tail, and bright scarlet throat shading into orange laterally. *Cyanomyia verticalis* of Mexico is brownish-green above and white below, with shining cobalt head and sides of the neck, and a reddish bill. The hen has a duller crown. *Amazilia* contains some thirty diverse members ranging from North Mexico to Peru, Guiana, Trinidad, and Tobago. *A. pristina* of Peru is greenish-bronze, with chestnut sides, rump, and tail, emerald throat, and white middle to the breast and abdomen. *A. cyanura* of Guatemala and Nicaragua is entirely green, though bluer towards the tail, and shining below. *Cyanophaea caeruleigularis* of Costa Rica, Panama, and Colombia is bright green, with glittering violet-blue chest. *Hylocharis* ranges from Guiana to South Brazil, *H. sapphirina* being deep green, with bronzy rump and tail, chestnut chin, sapphire-blue throat and breast. The female is whitish below with little blue.

(3) Forms with smooth beaks. *Eutoxeres*, which has the bill curved almost into a semi-circle, was placed by Gould with *Rhamphodon* and *Phaëthornis* in a Sub-family *Phaëthornithinae*, as opposed to *Trochilinae*, but this has not been generally accepted. The sixteen or more species of *Phaëthornis*, extending from South Mexico to Bolivia and Brazil, are often termed "Hermits" from their sombre tints of dull green, grey, and brown, or from their habit of frequenting dark forest-recesses. The tail is cuneate and the claws rather large. *Eupetomena macroura* of Brazil and Guiana, termed the "Swallow-tail" from its forking rectrices, has the two outer primaries in the male with curved and dilated shafts: the three outer feathers being similar in *Campylopterus* and *Sphenoproctus*, which range through Central America, and in the last case northern South America. The members of these three genera are denominated "Sabre-wings." The above species is green, with deep cobalt head and throat, and steel-blue tail. *Eugenes fulgens* of South Arizona, Mexico, and Guatemala is bronzy-green changing to black, the throat being lustrous green, and the crown rich violet. The female has a brownish crown, and greyish lower surface. *E. spectabilis* of Costa Rica is similar.

Docimastes ensifer of Colombia and Ecuador, which has a straight bill, longer than the head and body together, is coppery-green, with black cheeks and throat, and glittering green breast; the last being green and white in the hen. *Florisuga mellivora*, the Jacobin, occurring from South Mexico to Amazonia, is green, with the head and entire neck blue, the base of the hind-neck, the abdomen, and the middle of the lateral rectrices white. The female is chiefly green, varied with white below. *Topaza pella*, the "Crimson Topaz" or "King Humming-bird" of Guiana, is golden-red above, with greenish-orange rump, dark purple and cinnamon wings, and rufous lateral rectrices. The two median tail-feathers are bronzy with black tips; the next pair, which are elongated and curve outwards, are purplish-black; the throat is lustrous golden; the narrow pectoral band is black; the remaining lower parts are crimson. The hen is grass-green, with crimson on the throat, and black and cinnamon on the outer tail-feathers. The nest has been stated to be made of a fungus, and certainly the appearance justifies the assertion; but Dr. Paul, a great authority on Fungi, writes of an example which he brought home for the author from the Pomeroon river:—"The felt is formed of the fluff which clothes the young flower-spathes of the Kokerite Palm (*Maximiliana martiana*)," and his evidence ought to settle the question. *T. pyra*, of the Rio Negro and Eastern Ecuador, is redder above, with no cinnamon on the wings or lateral rectrices. The genus *Oreotrochilus*, and the four next succeeding, have particularly strong feet. In common with some half a dozen congeners which range southwards to Chili, *O. pichincha* of Ecuador inhabits the cloudy regions of the Andes near the snow-line; it is olive-green above, and has an entirely violet-blue head and throat, the latter being followed by a black line and white lower parts, while the lateral tail-feathers are steel-blue and white. The female is green above, ashy and white below. *Oreonympha nobilis* of Peru, which has a peculiar habit of suddenly stopping in its flight, is a large bird with somewhat forking rectrices. The main colour is bronzy-brown, with a blue crown divided in the centre by a brown bar; the black of the cheeks runs to a point below; the chin is green and the "beard" crimson; the lower parts are greyish-white; the tail has the external pair of feathers white. The hen has a brown and greenish crown and a black throat. *Oxypogon guerini* of

Colombia, the "Warrior" or "Helmet-crest," is dark green, with blackish sides to the head, a black and white crest, a green and white chin margined with black, a white beard, a greyish abdomen, and purplish and white lateral rectrices. The female lacks the elongated feathers, and has white under parts spotted with dusky. *Rhamphomicron heteropogon* of Colombia, one of the sharp-beaked "Thornbills," is greenish-bronze, with browner tail and abdomen, and a long amethystine beard surrounded by bronzy-black. *R. microrhynchum*, having rich purple upper parts and a lustrous green throat, extends to Ecuador, while other members of the genus range to Bolivia. The hens are comparatively dull. *Opisthoprora euryptera* of Colombia, which is bronzy-green with a little rufous and white below, has an upcurved bill, like *Avocettula*. *Patagona gigas*, the largest Humming-bird known, inhabits the Andes from Ecuador to Chili; it is greenish-brown, with white rump and rufous under parts. In *Aglaeactis*, of the Andes from Colombia to Bolivia, the coloration is brown, dark buff, or black, with glittering amethystine or green lower back, and a white or buff pectoral tuft. The chief marvel of the Family is, however, *Loddigesia mirabilis*, originally found in Northern Peru by a botanist named Matthews, and rediscovered by M. Stolzmann [1] in almost the same locality. It is shining bronzy-green, with whitish under parts surrounding a black central area; the head and its crest are lustrous cobalt-blue, the throat is emerald-green with black margin, the metatarsi are covered with white feathers. The two lateral rectrices are extraordinarily prolonged, and resemble black wires with large steel-blue terminal discs: the shafts normally cross each other at their bases and again near their tips, but the discs are frequently brought together in flight, or extended horizontally, if not turned above the head. The median tail-feathers are much reduced. The female is green, varied with white below; the external pair of steel-blue lateral rectrices shewing small spatules. *Cephalolepis delalandi*, of South-East Brazil, is bronzy-green above, and fine violet-blue bordered with grey below, while the long glittering green crest terminates in a single black plume. The crestless hen is grey below. *Eriocnemis*, of the Andes from Colombia and Venezuela to Bolivia, shares with *Panoplites* and the spatulate-tailed *Spathura* of the same regions the characteristic of possessing

[1] For the habits, see Taczanowski and Stolzmann, *P.Z.S.* 1881, pp. 827-834.

muff-like tufts of black, white, or buff, which cover the metatarsi. To take an example of the twenty or more species, where the sexes are fairly similar, *E. cupreiventris* is bronzy-green, with brighter under surface, purplish-black tail, reddish abdomen, and lustrous blue under tail-coverts. *Calothorax lucifer*, the "Mexican Star," is golden-green above and white below, with shining lilac-red throat; it has purplish-black lateral rectrices tipped with white, of which the outer is filiform, as are the external four in *Acestrura* of northern South America. *Selasphorus rufus*, of western North America, from Alaska to Mexico, is cinnamon above and white below, with golden-green crown and glittering red throat; the head-feathers are bordered with rufous, and the sub-median tail-feathers are emarginate. The female has chiefly green upper and white under parts. *S. platycercus*, resembling the next species, but with a rosy-red throat, occupies the Rocky Mountains and extends to Guatemala, the genus reaching Panama. They constantly have the outer primary or outer rectrix attenuated. *Trochilus colubris*, found at different seasons from the Fur Countries and the Great Plains to Guatemala, is green above and whitish below, the chin being black, the throat glittering ruby-red, and the forked tail chiefly bluish-black. The hen lacks the red colour. *T. alexandri* of western North America differs in its violet-purple throat. *Calypte annae* and *C. costae* of the South-West United States are green birds with mainly whitish lower surface, and have the crown and throat rosy and lilac respectively. The latter form has elongated gular plumes, as has the bluer Cuban *C. helenae*, where they are crimson. The minute *Mellisuga minima*, or "Bee Humming-bird," of Jamaica and San Domingo is green above and white below, with dusky throat-spots in the male. The equally small *Chaetocercus bombus* of Ecuador is green, with rosy throat, buff breast, and chiefly purplish-black rectrices, of which the outer four are short and spiny; the female is green above and cinnamon below.

Thaumastura cora, the "Peruvian Sheartail," is golden-green, with crimson throat shading into blue, and white under surface; the black and white tail has two enormously elongated sub-median feathers. The hen is white below, with buffish throat and flanks. *Prymnacantha popelairii*, one of another group of "Thornbills" (p. 437), has a yellowish-green crest with two long black filamentous plumes; the upper parts are bronzy-green with a white rump; the lower parts are black, with a glittering green

throat and rufous tibiae. The forked tail has the pointed narrow feathers steel-blue with white shafts. The hen has a dark green crown and black and white throat. This genus extends from Costa Rica to Bolivia and Brazil. *Lophornis* covers the same area, but reaches Mexico. *L. ornatus* has beautiful fawn-coloured tufts with green terminal spots, on the sides of the neck: and is chiefly bright green and cinnamon, with a rufous and purplish rump and a chestnut crest; the female exhibits more white below and lacks the crest and tufts. The remaining half score of species are similar or even more brilliant. *Heliactin cornuta* of Brazil alone of the Family has resplendent purple, green, and gold tufts above and behind the eyes. The coloration is shining green, with a bluer crown, black cheeks and throat, and white lower parts. The hen is green above and white below, with buff throat.

Fam. XIII. **Coliidae.**—This group is the only constituent of the Sub-Order COLII or Colies, termed Mouse-birds in South Africa from their creeping habits. They were formerly classed among the Passerine Fringillidae, to which they bear a certain outward resemblance, while at a later date a partial study of the anatomy seemed to point to an affinity with the Plantain-eaters; but it is now generally recognised that they should be placed among those Families which in this work form the Order Coraciiformes. They are small, tough-skinned birds, which would appear larger were it not for the short, dense feathering; the bill is stout and Finch-like, the long metatarsus exhibits one series of scutes in front, and reticulations behind; the toes with their slender claws are all directed forwards, but the hallux and apparently the outer toe can be turned backwards. The wings are weak and rounded, with ten primaries and nine secondaries; the very long tail has ten rectrices, the outer pair not being greatly developed. The furcula is U-shaped; the syrinx has one pair of tracheo-bronchial muscles: the tongue is flat and cartilaginous with horny papillae; an after-shaft is present; the adults, and probably the nestlings, have no down.

Colies frequent forest-districts, especially where the bush is thick; they are active, yet not very shy, and are usually found, except during the breeding season, in flocks of some six to eight individuals. The flight is laboured, with many a quick beat of the wings; but it is direct and fairly rapid, though seldom sustained beyond some neighbouring tree, where the bird may be seen stealing

through the foliage, and aiding its creeping movements with its bill. The most peculiar habit, however, is that of climbing with the whole metatarsus applied to the branch, a fact which adds greatly to the mouse-like appearance. When roosting, Colies are said to pack themselves together in masses, and to hang by the feet; rarely are they seen perching or hopping, though they often cling to the boughs with the head downwards. The note is disagree-

Fig. 91.—Cape Coly. *Colius capensis.* × $\frac{1}{3}$.

able and harsh. The cup-shaped nest of twigs, roots, and grass, with a lining of wool or finer grasses, is placed in thick bushes, or near the ground in low trees; the three or four eggs, hardly pointed at either end, are dull white, sometimes streaked with orange or brown. Fresh leaves are not uncommonly added below them. The food consists almost entirely of fruit, though green shoots, or even insects, are believed to be occasionally eaten.

The eight or nine species of the single genus *Colius*, ranging through the whole Ethiopian region except Madagascar, vary in coloration from brown with darker vermiculations or bars to

grey or ash-colour, the abdomen being buff. Fine crests add to the general appearance. *C. macrurus* is remarkable for a tuft of blue feathers on each side of the nape, *C. leucocephalus* has a white head; *C. leucotis* white ear-coverts; *C. nigricollis* a black forehead and throat: *C. capensis* two stripes of black on the back enclosing one of white; while that species and *C. castanonotus* have maroon rumps. The bare skin surrounding the eye is scarlet in *C. erythromelon*, *C. macrurus*, and *C. capensis*, and apparently bluish-grey elsewhere. The legs are red in life, fading to buff after death. *C. striatus* is very nearly uniform brown, *C. erythromelon* shews a greenish tinge and has some buff on the head. The sexes are similar, nor are the young very different. The length is from eleven to fourteen inches. Kafirs consider these birds very good eating.

Fam. XIV. **Trogonidae.**—The Trogons are the sole tenants of the Sub-Order TROGONES, a very distinct group of birds of brilliant coloration—the Quezal, as will be seen below, being the most splendid of all. Their general aspect is somewhat heavy; the neck is abbreviated; the bill, stoutest in *Pharomacrus* and most slender in *Euptilotis*, is short and strong, with a wide bristly gape, and a curved culmen terminating in a hook. The maxilla in these genera, as well as in *Harpactes* and *Hapalarpactes*, has a terminal notch, while both mandibles are more or less serrated in adults of *Trogon*, *Hapaloderma*, *Tmetotrogon*, and *Prionotelus*. The foot is comparatively small and weak, with the short metatarsus feathered and somewhat scaly: the second toe is reversed, a "heterodactylous" arrangement (p. 10) unique among birds. The moderate wing has ten primaries, and from eight to ten secondaries; the upper wing-coverts being elongated in *Pharomacrus*, especially in the males. The long rectrices are twelve in number, and are concave at the end with divergent tips in *Prionotelus*; the feathers, moreover, are often square at the extremity—a noticeable peculiarity in the Family: while in the Quezal, *Pharomacrus mocinno*, the male has enormously developed upper coverts to the tail, which extend far beyond it, the two median being the longest; in its congeners and in females generally they equal the rectrices; in *Euptilotis* they are only half the length. The furcula is U-shaped; the tongue flat; the syrinx tracheo-bronchial: the aftershaft long; the nostrils are bristly: the adults have no down; and the nestlings are said to be naked for a short period. The large soft

feathers are easily detached from the delicate skin. The male of *Pharomacrus mocinno* has a fine rounded crest, less developed in the female and in its other congeners. *Euptilotis, Tmetotrogon,* and *Prionotelus* have the ear-coverts filamentous and hair-like. *Pharomacrus pavoninus* has a red bill, as has *Prionotelus* in part; the usual colour in the former genus, and in *Trogon* and its allies, being yellow for the cock and more horn-coloured or black for the hen, but in *Harpactes* violet or bluish, with a duller tip in the female. The orbits are partially or entirely bare in *Hapaloderma, Harpactes,* and *Hapalarpactes,* the skin being, it would seem, yellow, violet, or blue. The Family ranges through the tropical portions of the Indian, Ethiopian, and Neotropical Regions, *Harpactes* and *Hapalarpactes* being found in the first, *Hapaloderma* in the second, and the other five genera in the third. *Trogon ambiguus* reaches northwards to Arizona and Texas. The number of species is nearly fifty, of which the largest (*Pharomacrus mocinno*) measures some fourteen inches, the smallest (*Harpactes duvaucelii*) about nine.

Trogons are usually seen singly or in pairs, though sometimes in small flocks; they are rarely shy, and often so unsuspicious that they may be killed with a stick. They customarily sit almost motionless in the mid-day heat, with the head drawn in upon the shoulders and the body vertical, every now and then opening and shutting the tail. Their haunts are in the thickest forests, which they seldom leave for more open or sunny places; here they creep about the trees or sit some half-way up on leafless branches, darting off to catch a passing insect or to secure a tempting fruit, since nearly all their food is taken on the wing. The noiseless flight is rapid, but short and jerky, with occasional undulations. The Quezal, at least, clings to trees like a Woodpecker, but the feet are ill adapted to climbing, and perfectly unfit for walking. The voice of this species consists of two plaintive sibilant notes, gradually swelling into a loud cry, and varied by discordant sounds; many forms, however, utter a reiterated "coucou," and will also cluck, whistle, or chatter, though ordinarily silent, except when breeding. The food of the New World species is stated to consist principally of fruit, but lizards, grasshoppers, lepidoptera, caterpillars, ants, beetles, small crabs, and terrestrial molluscs are eaten; while the Old World forms seem to prefer an insect-diet. No nest is made, but a hole is usually bored or enlarged in the top or side of a rotten stump or branch, in which

are deposited from two to four roundish eggs of a white, bluish, greenish, or buff colour. *Trogon surucura* has been observed clinging to a tree-trunk and excavating a cavity in an ants' nest. The male at times incubates. The flesh is not unpalatable.

Hapalarpactes reinwardti of Java is dark bluish-green above with a more olive crown, and yellow below with orange abdomen; the primaries are black and white, the secondaries and their coverts green with yellow bars, the rectrices purplish as compared with the back, the lateral pair freely marked with white. The female has brown instead of yellow on the wing. *H. mackloti* of Sumatra has the rump chestnut in the male. The genus *Harpactes* ranges from India and Ceylon to Cochin China, the Indo-Malay Islands, and the Philippines. *H. kasumba* has the crown, throat, and chest black, the nuchal collar and under parts crimson, while a white band divides the two colours below; the upper parts are orange-rufous; the two median rectrices chestnut tipped with black; the rest of the tail and the wings black and white. The hen is brown above, becoming rufous towards the rump; the throat and chest are grey, the remaining lower surface and the wing-markings buff. *H. orescius* has an olive-yellow head, a brilliant orange breast, and a chestnut back; the female being more sombre. *Hapaloderma narina*, ranging from North-East Africa to Cape Colony and thence to Angola, is brilliant bronzy-green above; the wings and tail are black and white with a blue and green wash, the secondaries and wing-coverts being vermiculated with white; the chest is green; the breast and abdomen are crimson. The hen has the throat and chest brown, the breast duller. *H. constantia* extends from the Calabar River to Fantee, *H. rittatum* is East African. The genus *Trogon* is found from South Arizona and Texas to North Argentina. *T. mexicanus* is bronzy-green above and on the chest, the sides of the head and the throat being black, and the remaining under parts crimson, surmounted by a white band: the wings are blackish with white vermiculations on the secondaries and coverts; the two median rectrices are green with black tips, the others black and white. The female has the chest and upper surface, including that of the tail, brown, the wing-vermiculations buff. *T. surucura* has the most southerly range of the two dozen species. *Prionotelus temnurus*, peculiar to Cuba, has the sexes similar; the upper parts are bronzy-green, the head is black, glossed with purple and blue,

FIG. 92.—Quezal. *Pharomacrus mocinno.* × $\frac{1}{4}$.

the under parts are grey with crimson abdomen. The six middle tail-feathers are bronzy-green, tinged with purple, the remainder and the wings black and white. In *Tmetotrogon rhodogaster*, restricted to San Domingo, the upper surface is bronzy-green, the lower grey with crimson abdomen. The blackish wings have white-edged primaries, the median pair of rectrices are purple and green, the others purplish-blue. The female has white bars on the upper wing-coverts. *Euptilotis neoxenus* of Mexico has a greenish-black head and throat, and a crimson breast and abdomen, while the rest of the plumage is bronzy-green, except for the black and white wings and the six purplish-black median rectrices. The hen has a greyish head, throat, and chest. *Pharomacrus mocinno*, the Quezal of the higher districts from Guatemala to Veragua, is brilliant iridescent green above, tinged with blue on the far extended tail-coverts; the throat is green, the under parts are gorgeous crimson, the remiges and the six median rectrices are black, the remainder chiefly white. A full crest and elongated wing-coverts add to the bird's appearance. The female has the long feathers less developed; the head and under surface brownish-grey, with a

green tinge on the former and on the chest; the vent crimson. Three other species range from Colombia to Bolivia. The decorative feathers of the Quezal were reserved for chiefs in olden times.

Trogons are ancient forms which once occurred within the Palaearctic countries, as is shewn by the discovery of the fossil *Trogon gallicus* in the Lower Miocene of France.

The Sub-Order PICI contains, according to Dr. Gadow, the Families *Galbulidae*, or Jacamars and Puff-birds, *Capitonidae*, or Barbets and Honey-guides, *Rhamphastidae* or Toucans, and *Picidae*, or Woodpeckers and Wrynecks. All these undoubtedly belong to that author's Order Coraciiformes, though Garrod and W. A. Forbes included the *Galbulidae* and several of the allied Families in their Passeriformes.

Fam. XV. **Galbulidae.**[1]—This may be divided into the Subfamilies, (1) *Galbulinae*, or Jacamars, and (2) *Bucconinae*, or Puff-birds.[2] The former have a long straight bill, compressed and pointed, with angular genys; *Jacamerops*, however, having it curved, ridged, and dilated basally. The feet are weak, the metatarsi being scutellated in front and smooth behind, with the toes zygodactylous; while *Jacamaralcyon* alone lacks the hallux. The rounded wings have ten primaries, with the outer much reduced, and from ten to twelve secondaries; the tail of twelve feathers is sometimes short and square, sometimes long and more or less graduated, the external pair of rectrices being diminutive or absent. The furcula is U-shaped, the tongue long, tapering, and membranous; the nostrils are slightly bristly, with an internal membrane in *Jacamerops;* the aftershaft is rudimentary; and there is no down on the adults or the blind nestlings. The plumage is particularly soft.

Sub-fam. 1. *Galbulinae.*—Jacamars are ordinarily brilliant coppery- or golden-green above, and more or less rufous below; though the upper parts may be metallic blue, chestnut, or greyish-black. The bill and feet are generally blackish; but in *Galbalcyrhynchus*, *Brachygalba albigularis*, and *B. melanosterna*, the bill is white, in *Galbula albirostris* and *G. cyaneicollis* it is yellow and black. The largest species (*Jacamerops grandis*) is not eleven inches long. The females resemble the males, or are paler below,

[1] For the Family generally, see Sclater, *Monograph of the Jacamars and Puff-birds*, London, 1879-82; and *Cat. Birds Brit. Mus.* xix. 1891.

[2] This is Dr. Gadow's view; but two separate Families are decidedly preferable.

and lack the usual white throat. The Sub-family ranges from Mexico to South Brazil.

These birds are usually found towards the outskirts of forests near water; where they frequent lofty trees, and commonly sit crouched upon some dead or slender branch for hours, merely moving the head from time to time. The food consists of insects—especially flies or moths—which are often caught upon the wing, and crushed against the boughs before they are swallowed, the bird sallying forth and returning to its perch like a Fly-catcher. The regular note is short and seldom heard; but *Jacamaralcyon* has, according to the natives, an agreeable whistling song. The flight is quick and jerky. Generally found solitary or in pairs, the various species occasionally bathe in small flocks. The three or more roundish white eggs are laid in holes in banks, or possibly in old stumps. In some districts names equivalent to "Large Humming-birds" are given to Jacamars; while early writers confounded them with Kingfishers.

Urogalba paradisea of Guiana, Peru, and Brazil, and *U. amazonum* of Upper Amazonia, characterized by an extremely long and tapering median pair of tail-feathers, are dark blue, with bronzy and green reflexions, brownish heads, and white throats. Seven out of ten members of the genus *Galbula* are also Amazonian; the remainder reaching South Mexico, Bolivia, and South-East Brazil, and one of them Trinidad and Tobago. *G. albirostris* is brilliant bronzy-green above, with rufous lower parts and white throat; most of its congeners being fairly similar, though *G. chalcothorax* has a decided red and blue gloss on both surfaces and a white abdomen. *Brachygalba*, which extends from Colombia to Amazonia, includes six diminutive forms, with a varying admixture of green and brown above, of black, brown, rufous and white below. *Jacamaralcyon tridactyla* of South-East Brazil is greenish-black, with a brown, rufous-streaked head, and a white mid-breast and abdomen. *Galbalcyrhynchus leucotis* of East Ecuador and Upper Amazonia is chestnut, with white cheeks and darker head and quills. *Jacamcrops grandis*, ranging from Veragua to Amazonia and Ecuador, is bright coppery-green, with blackish wings and tail, a white throat-patch, and a chestnut abdomen.

Sub-fam. 2. *Bucconinae*.—The Puff-birds differ structurally from the *Galbulinae* only in having shorter and stouter beaks, with hooked or incurved tips; stronger metatarsi, which are scaly

behind; fully developed lateral rectrices; and no aftershaft. The habits of the two groups are similar, while the aforesaid English name probably refers to the puffy appearance of the head while the birds are resting. They are black, brown, or rufous in hue, relieved by white markings; the bill being red in *Bucco chacuru*, *B. maculatus*, *B. striatipectus*, and *B. collaris*, and red or yellow in *Monacha*. The entire range of the Family, extending from Guatemala and Honduras to Argentina, is occupied by the twenty hook-billed species of *Bucco*. *B. dysoni* is blue-black, with a white under surface crossed by a broad black band, and a white forehead and nape; *B. hyperrhynchus* is similar with a larger bill; *B. collaris* differs in its rusty-red upper parts barred with black; *B. bicinctus* has these mottled with brown, and two black bands on its buff breast; *B. maculatus* has a rufous chest and black spots on the white belly; and so forth. The half-dozen species of *Malacoptila*, extending from Guatemala to Brazil, are brownish birds, striated with rufous; the lower parts being more or less fulvous, often with black and white breast-bands. The diminutive *Micromonacha lanceolata* of Upper Amazonia is rufescent above; the forehead and under parts are relieved by black, while each outer rectrix has a black bar. The Nunlets (*Nonnula rubecula* and its congeners) are also among the smallest of the Family, and are distributed from Panama to Peru and Brazil; they are brown above and ferruginous beneath, with a little white. *Hapaloptila castanea* of Colombia and Ecuador is a hook-billed species, with olive-grey upper and chestnut under parts, a white forehead and throat. *Monacha* comprises about seven large blue-black forms, ranging from Nicaragua to South-East Brazil and Bolivia, some of which have white on the wings

FIG. 93.—Puff-bird. *Bucco hyperrhynchus*. × ⅔.

and round the base of the bill. *Chelidoptera tenebrosa*, the "Swallow-wing," of Venezuela, Guiana, and Amazonia, has long wings and a short square tail; the colour being blue-black, with a chestnut lower abdomen and white tail-coverts. The larger *C. brasiliensis* inhabits Brazil. This is apparently the only member of the group of which the nest has been found; it was a mere hole in a bank, containing two shining white eggs.

Fam. XVI. **Capitonidae.**—This is here taken to contain the Sub-families (1) *Capitoninae*, or Barbets, and (2) *Indicatorinae*, or Honey-guides. Much confusion has arisen from the fact that Brisson included the former in his genus *Bucco*, while subsequently Garrod and W. A. Forbes combined the *Rhamphastidae* (Toucans) with the above-mentioned groups in their *Capitonidae*.

Sub-fam. 1. *Capitoninae*.—Barbets are heavy, ungraceful birds, with large stout bills, which are swollen at the base, occasionally sulcated, and more or less beset with bristles. *Pogonorhynchus* and *Tricholaema* have the maxilla toothed—generally strongly, while that of *Tetragonops* fits into a fissure in the truncated tip of the mandible. The scutellated feet are fairly powerful, with zygodactylous toes and rather long claws; the moderate wings have ten primaries, and ten or eleven secondaries; the tail of ten rectrices is more usually short than long, and may be square, rounded, or graduated. The clavicles are somewhat reduced; the tongue is said to be thin, short, and cartilaginous; the nostrils are often bristly, an aftershaft is present; while both adults and young lack down.

The brilliant plumage commonly exhibits vivid contrasts of scarlet, blue, purple, or yellow on a green ground, but *Calorhamphus* and *Gymnobucco* are sombre in hue; different species, moreover, have crests, naked orbits, or brightly coloured bills. The sexes are alike, except in *Capito*; the young are duller.

The members of this Family are strictly arboreal, and inhabit forests, or well-timbered cultivated districts and gardens; not being usually shy, or easily disturbed while feeding in flocks. The tops of trees are their natural resort, yet pairs frequently descend to the bushes, where they hop from branch to branch; they also climb up and down the trunks, and some African forms are said thus to search the cracks for insects. The flight is powerful and undulating, but Barbets are inactive birds, and often sit motionless for hours, their plaintive whistle, or noisy ringing note of two or three syllables being heard at intervals

throughout the day or on moonlight nights. The latter cry is variously syllabled kuttooruk, tok-tok, or poo-poo-poop, while its likeness to the sound of striking metal has given the name of "Copper-smith," "Tinker-bird," and "Iron-smith" to *Xantholaema haematocephala*, *Barbatula pusilla*, and *Cyanops faber*. While uttering their protracted notes Barbets often move their heads from side to side, and certain American species jerk their tails over their backs like Toucans. The food consists of fruits of every sort, buds and petals of flowers, and even green bark, or in many cases almost entirely of insects; in captivity pieces of meat or small birds seem acceptable, the latter being usually battered upon some hard substance before being swallowed. When feeding on trees these birds are so noiseless that the falling berries alone betray their presence, while they quit the feast with great reluctance. They cut neat circular nesting-holes, which turn downwards and widen out below, in soft or decaying wood, generally on the under side of a branch; and lay three, four, or even five eggs, oval, thin-shelled, white and somewhat shining, on a few chips or sometimes other substances. A week or two may be occupied in excavating the cavity, while it is a moot question whether the tapping that goes on in spring is made in finding suitable breeding quarters or in obtaining insects. Von Heuglin saw two borings in banks. The young accompany their parents for a considerable time. Barbets do not thrive well as cage-birds.

The range extends throughout Tropical Asia, Africa, and America, and even slightly beyond those bounds in the two former; but America possesses only the large genus *Capito* and the two species of *Tetragonops*, whereas the other regions divide the remaining groups fairly evenly between them. Captain Shelley [1] admits nineteen genera and a hundred and ten species. The former are difficult to diagnose, and depend largely on colour: of the latter the subjoined are merely a few of the most typical or remarkable forms. *Pogonorhynchus* (including *Erythrobucco* and *Melanobucco*) and *Tricholaema*, including respectively some fifteen and ten species, are exclusively African groups, noticeable for the long, black bristles before the eye and below the beak. *P. dubius* of West Africa has bluish-black upper parts, with a little crimson on the wing-coverts and a white dorsal patch; the cheeks and ear-coverts are crimson, separated by a black line;

[1] *Cat. Birds Brit. Mus.* xix. 1891, pp. 13-121.

the anterior under parts are crimson, the posterior scarlet, these being divided by a black pectoral band, and relieved by yellowish patches on the sides; the bill is reddish-yellow, the naked orbits are orange. *Tricholaema leucomelan* of South Africa is blue-black above, with plentiful yellow and scanty white markings, but white below with black throat. The forehead is crimson, the eyebrow and orbits are yellow, the bill is blackish. The breast-feathers have hair-like shafts. *Gymnobucco calvus* of West Africa is brown with paler streaks; having the bill and chin-bristles yellowish, and browner bristles round the nostrils in at least one sex. The naked head is blue. *Barbatula*, of the Ethiopian Region generally, contains a dozen small species, which exhibit soft loose plumage of black, varied with red, yellow, or white. *B. minuta*, extending from North-East Africa to Senegambia, has the forehead scarlet, the rump and under surface yellowish, the bill black, and somewhat scanty bristles. *Stactolaema anchictae* of Benguela, and *S. olivaceum* of East Africa, are respectively brown with yellowish head and throat, and olive-green with those parts blackish. The bill is black. *Calorhamphus hayi*, found from South Tenasserim to Sumatra, is yellowish-brown above and yellowish-white below, with black-shafted spiny crown-feathers, rufous throat, black bill, reddish orbits and no chin-bristles. *C. fuliginosus* of Borneo is similar. *Megalaema*, *Chotorhea*, *Cyanops* and *Mesobucco*, with about thirty members in all, extend from India and Ceylon to China, Formosa, Hainan, and the Great Sunda Islands. They are soft-plumaged green birds, having parti-coloured heads and throats tinted with blue, yellow, red, and black, or merely brown and white; the bill and feet are yellowish, greenish, or black. The bristles vary in their development. *Psilopogon pyrolophus*, of the mountains of the Malay Peninsula and Sumatra, is green, with a black forehead, a brownish head crossed by a greyish-white band, and a double belt of yellow and black below the green throat. The long nasal bristles are black, tipped with scarlet; the superciliary stripe and lower eye-lid are green; the upper eye-lid is yellow; the bill is yellowish-green with black central band; the legs and orbits are greenish. The unusually long tail is much graduated, and has pointed median rectrices, while these are square in some ten Ethiopian species of *Trachyphonus*, where the tail is similar. *T. cafer* of South-East Africa is bluish-black above with white markings;

the rump being yellow; the upper tail-coverts scarlet; the forehead, sides of the head and lower parts yellow, with a tinge of scarlet on the throat, which is followed by a black and white gorget. The fine occipital crest is black, the beak green; the feet and orbits are dusky. *T. margaritatus*, of North-East Africa, has brown upper parts with round white spots; the upper and lower tail-coverts are crimson; the rump, head, neck, and under surface are yellow, except for the crown and marks on the hind-neck and throat, which are black, and for an indistinct chest-band of red, surmounted by one of brown. The beak is red, the feet are bluish. The exclusively Central and South American *Capito* is the only genus in which the sexes differ; the dozen or more species have, moreover, few bristles round the bill. *C. niger* of Guiana is black above, varied with yellowish and buff, and sulphur-yellow below with a few black spots, which become plentiful in the female. The forehead, cheeks, and throat are orange-scarlet, the bill is plumbeous. *C. salvini* of Costa Rica and Panama has green upper and yellow under parts; most of the head and the throat being scarlet, the flanks green and white, and a whitish band descending the sides of the neck. The female lacks the scarlet, but has a dull golden crown and nape, pale blue cheeks, and an orange gorget below the green throat. The bill is greenish-yellow, the orbits are yellowish. *Tetragonops rhamphastinus* of Ecuador, in which the nostrils lie in grooves, has the crown black, with white sides merging gradually into a blue-grey throat; a glossy black nuchal crest; a rufous-olive mantle; orange lower back and upper tail-coverts; blackish-blue wings and tail; scarlet breast with orange sides; and yellowish-green abdomen. The bill is orange-yellow with dusky tip. *T. frantzii* of Costa Rica, called "Gallinita" from its chicken-like cry, has greenish-olive upper and yellowish-green lower parts, with golden-orange forehead, cheeks and throat, a plumbeous bill, and a similar crest to its congener. This genus bears a certain resemblance to the Toucans.

Sub-fam. 2. *Indicatorinae.*—The Honey-guides are contained in the two genera *Indicator* and *Prodotiscus*, with nine and two species respectively, which were formerly placed among the Cuckoos. Their chief interest centres in the fact that they are said to conduct travellers to bees' nests, as will be seen below.

From the Capitoninae, *Indicator* differs in the stout Finch-

like bill with ridged and laterally swollen maxilla, while that of *Prodotiscus* is more slender and pointed. Moreover, the metatarsi are short; the nostrils possess a narrow membrane and are not bristly; and the rectrices number twelve, save in the last-named genus, which has ten. The curiously interrupted range includes the whole Ethiopian Region, except Madagascar; the Himalayas; and the Malayan and Bornean mountains. The sexes are generally similar, while almost all the forms, which hardly exceed a Lark in size, are chiefly dull brown, with a yellow wash, and some white on the rump, tail, or wings.

Indicator xanthonotus of the Himalayas is blackish above, with golden forehead and orange rump-region, and greyish below; the latter colour merging into yellow on the throat and black on the abdomen. *I. archipelagicus* of the Malay Peninsula and Borneo, and *I. sparrmani* of Tropical Africa, except the western forests, exhibit a yellow shoulder-patch; while the males of the latter and of *I. major* of the same districts have black throats, which are whitish and yellow in the respective females. *I. minor*, and the remaining Ethiopian species, differ from the last two forms in having no white on the lower back. *Prodotiscus regulus* of Natal, and *P. insignis*, ranging from the Gaboon to East Equatorial Africa, are particularly dull.

Circumstantial accounts of eye-witnesses so clearly shew that bees' nests are found through the instrumentality of these birds, that their intention can hardly be doubted, and it has been said that not only man but the ratel (*Mellivora capensis*) is conducted; the object of attraction, however, occasionally turns out to be a leopard, cat, snake, or dog. Honey-guides call attention by a shrill cry or hiss, and will even fly in the face of a traveller, as if enraged at not being followed; they eat bees, grubs, and honey, and are asserted to lay white eggs in the nests of Barbets and the like.[1] Sir John Kirk writes[2] of the habits of *Indicator minor*—"The Honey-guide is found in forests, and often far from water, even during the dry season. On observing a man it comes fluttering from branch to branch in the neighbouring trees, calling attention. If this be responded to, as the natives do by whistling and starting to their feet, the bird will

[1] Layard, ed. Sharpe, *Birds of South Africa*, 1875-84, pp. 166-171. Cf. Sandeman, *Eight Months in an Ox-Waggon*, 1880, pp. 235-239. [Extract, *Ibis*, 1880, p. 286.]

[2] *Ibis*, 1864, pp. 327-328.

go in a certain direction and remain at a little distance, hopping from one tree to another. On being followed it goes further; and so it will guide the way to a nest of bees. When this is reached, it flies about, but no longer guides; and then some knowledge is needed to discover the nest, even when pointed out to within a few trees. I have known this bird, if the man after taking up the direction for a little then turns away, come back and offer to point out another nest in a different part. But if it do not know of two nests, it will remain behind. The difficulty is, that it will point to tame bees in a bark-hive as readily as to those in the forest. This is natural, as the bee is the same; the bark-hive, 'Musinga' as it is named, being simply fastened up in a tree and left for the bees to come to. The object the bird has in view is clearly the young bees. It will guide to nests having no honey, and seems equally delighted if the comb containing the grubs be torn out when it is seen pecking at it."

Fam. XVII. **Rhamphastidae.**—The Toucans[1] are easily recognisable by their huge beak, only paralleled by that of the Hornbills, of which some authors have considered them the Neotropical representatives; but whereas in the latter this beak is usually surmounted by a casque of varying size, in the Toucans it is shaped much as usual, though abnormally developed. It does not seem to interfere with the bird's powers of flight or feeding, and indeed the structure of both mandibles is admirably calculated to combine bulk with strength and lightness; the external walls being so thin and elastic that they are said in some species to be compressible by the fingers, while the inner cavities are filled with a network of bony columns, to which the air has constant access. Moreover, the maxilla is so perfectly hinged to the skull that the utmost ease in mastication is secured, the serrated edges further aiding in the process. In *Aulacorhamphus* the mandibles are grooved, and *Andigena laminirostris* has a square basal plate on each side of the culmen. The metatarsi are stout and scutellated on both aspects, the toes are papillose below, the claws sharp and curved. The somewhat weak wings have ten primaries and twelve secondaries: the square, rounded, or graduated tail of ten rectrices is capable of free vertical motion, and is frequently jerked up over the back. The furcula is U-shaped; the tongue is long, thin and narrow, with feather-like margins towards the tip; the nostrils

[1] So called either from the note, or from two words meaning "nose" and "bone."

open backwards behind the bill-sheath in *Rhamphastus*, upwards or sideways near the hind part of the culmen in the other genera; the syrinx is tracheo-bronchial; the aftershaft is rudimentary or absent; and neither adults nor nestlings shew any down.

The coloration of the long, loose plumage, and of the beak and naked orbits, is most brilliant and varied; the females are smaller and duller than the males, and quite unlike them in *Selenidera;* while the young resemble the former, but have softer and differently-tinted bills. The feet are grey or green. *Pteroglossus beauharnaisi* has the black shafts of the crown-feathers dilated and coalescent with the barbs, producing an appearance like curls of horn.

Toucans, except just after moulting, are shy and restless; they are more or less gregarious, and small flocks gather to feed or bathe in the morning or evening; at noon they sit motionless on some lofty tree, but at other times may be seen jumping about the branches. At night they roost with the tail thrown forward upon the back, and the head turned to meet it. Their flight is easy, graceful, and direct, accompanied by occasional noisy flaps of the wing, the bill being carried horizontally; they rarely seek the ground, where they hop about obliquely in awkward fashion. All the species live chiefly on fruits, including seeds; but Azara's statement that they destroy small birds, and devour both eggs and young, is possibly quite correct, as in captivity they exhibit great excitement and delight when furnished with meat, mice, reptiles, and so forth,[1] tearing the food to pieces and masticating it with their serrated mandibles. Should, however, the object be small, they throw back the head and swallow it at a gulp; while a curious habit has been observed of regurgitating the substances for further mastication. Caterpillars, ants, and the like are added to the diet in the breeding season. When feeding in company, Toucans, like Rooks, post a sentinel, whose harsh, chattering scream can be heard for at least a mile: they are especially noisy in the morning and evening, or in wet weather. The unmelodious cry seems to vary considerably in the different species; being described as a croak, a hoarse note, a clear yelp, or a jarring sound like that of a Mistletoe Thrush. Owls and diurnal Birds of prey are often surrounded by a noisy mob of Toucans, which jerk their tails as they follow. Two oval and somewhat glossy white eggs are deposited in hollow limbs of tall trees. These birds are frequently eaten by

[1] See Broderip, *Zool. Journ.* i. 1825, p. 484; Vigors, *op. cit.* ii. 1826, pp. 466-483.

the colonists and natives, the latter using their plumage to decorate their bows or their persons, while the beaks make convenient powder-flasks. They are easily tamed, and become amusing pets. The various forms extend throughout the forests of Tropical America down to the mangrove swamps of the coast, some occurring at an altitude of from six thousand to ten thousand feet on the mountains; northwards *Rhamphastus carinatus, Pteroglossus torquatus,*

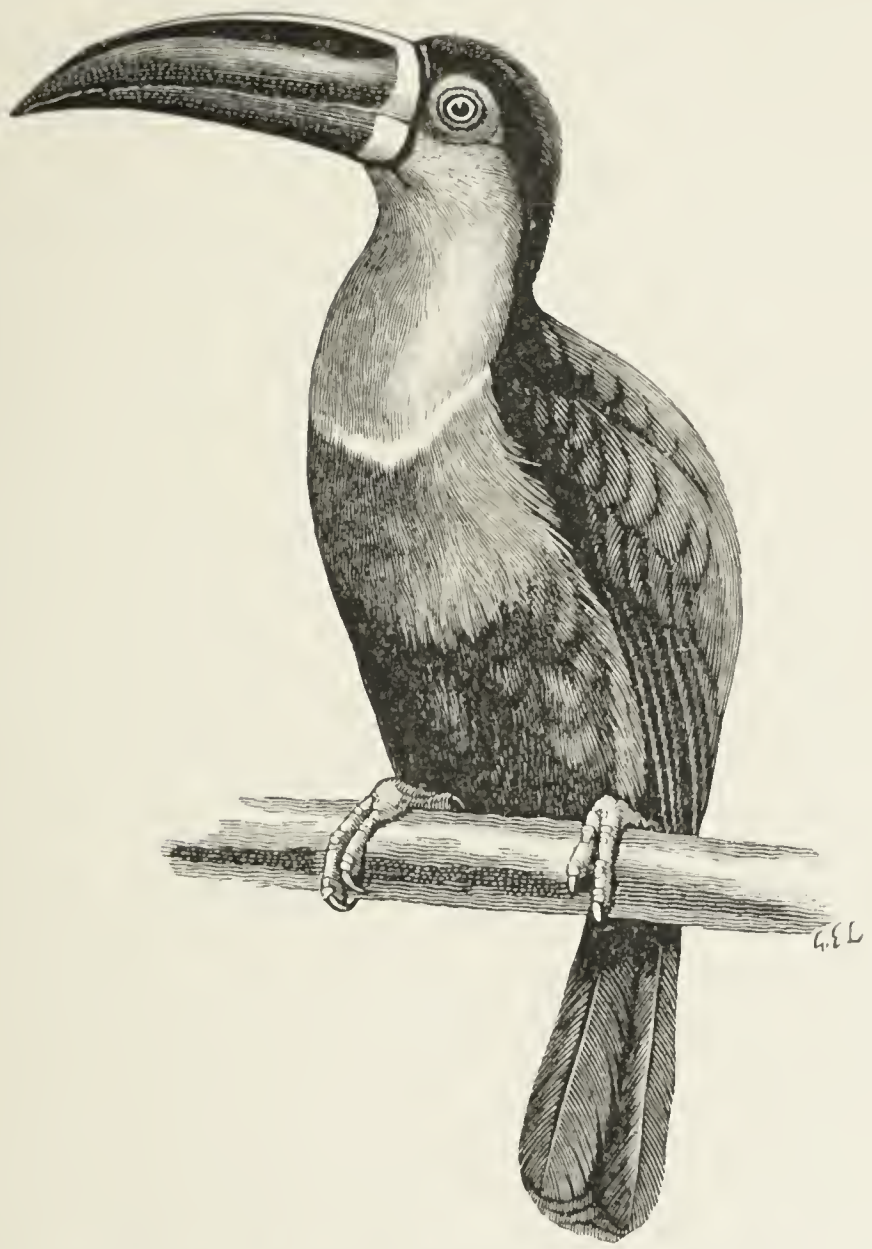

FIG. 94.—Ariel Toucan. *Rhamphastus ariel.* × ⅓.

Aulacorhamphus prasinus, and *A. wagleri* reach South Mexico; southwards, *Rhamphastus toco* ranges to Argentina; but westwards no species crosses the Andes south of the Gulf of Guayaquil. They are not represented in the Antilles, though *Rhamphastus vitellinus* extends to Trinidad. Dr. Sclater[1] recognises five genera, comprising fifty-nine species, the majority inhabiting Amazonia and Guiana.

The genus *Rhamphastus* contains fourteen members, with

[1] *Cat. Birds Brit. Mus.* xix. 1891, pp. 122-160.

nearly the same range as that of the Family, including the type and sole Argentine species *R. toco*, one of the largest forms, two feet in length. This is black, with white rump, throat and fore-neck (the last bordered with red), crimson vent, blue orbits, and orange bill terminally blotched with black, which has been likened to a lobster's claw. Several species have the throat and rump yellow or orange, or the latter scarlet, as in *R. ariel*. The brilliant bill and orbits vary considerably in colour; the tail is square. *Andigena* comprises some five forms from the highest forests of Colombia, Ecuador, Peru, and Bolivia, olive-brown or dark green above, and with hair-like bluish-grey plumage below; the crown is black, the nape black or grey, the vent scarlet, the rump yellow, and the tip of the graduated tail chestnut, except in one instance. The bill shews black, yellow, or red, in varied combination, *A. laminirostris* having a square ivory-white basal plate on each side of the maxilla. *A. bailloni*, of South-East Brazil, doubtfully placed in this genus, has a scarlet rump, yellow under parts, greenish and reddish bill, and red orbits. *Pteroglossus*, the most brilliant genus in the Family, exhibits green, scarlet, and yellow hues, with areas or bands of black and scarlet on the lower surface in thirteen out of eighteen species. The tail is graduated, and the feathers below are somewhat hair-like. These Araçarís, as they are called, range from South Mexico to Bolivia and South Brazil. The lovely *P. beauharnaisi*, of Upper Amazonia, has dark green upper parts, with crimson on the rump and mantle; and light yellow lower parts, tinged with red, which shew a scarlet ventral band and black spots on the throat; the maxilla is black with orange culmen, the mandible white. *P. aracari* of Guiana and Lower Amazonia has no red on the mantle, the smooth head and throat are black, the maxilla is white with black culmen, the mandible black. Some six species of *Selenidera*, remarkable for the dissimilar sexes, and generally for the transversely striped or blotched beak, range from South-East Brazil and Upper Amazonia to Nicaragua. The males, except in *S. spectabilis*, have a distinct nuchal crescent of yellow, less marked in the females; the former have the head and breast black, the latter usually chestnut; but the hen of the above species has the under surface black, that of *S. piperivora* greyish-green. The general colour is dark green, with brown tip to the tail, yellow or orange ear-coverts, and scarlet vent; the beak is whitish, reddish, or greenish, with black markings. *Aulacorham-*

phus has some dozen fairly uniform green members, relieved by a white, bluish, or black throat. The rump may be crimson or rufous, the rectrices tipped with chestnut, and the bill a mixture of red, black, yellow, or horn-colour, usually with a white line at the base. The range is from Mexico to Guiana and Bolivia.

Fam. XVIII. **Picidae.**—The Woodpeckers form a very large Family of scansorial birds with zygodactylous feet, which is so natural that Huxley raised it to higher rank as *Celeomorphae*, while Parker separated it still further as *Saurognathae*. The two Sub-families are (1) *Picinae*, or Woodpeckers, and (2) *Iynginae*, or Wrynecks.

Sub-fam. 1. *Picinae.*—The chief external peculiarities of this section lie in the form of the large head, the neck, and the tail-feathers. The neck is often much compressed, with exceedingly powerful muscles, which, coupled with the strong, wedge-shaped bill, enable the bird to operate with ease and celerity upon the boles and limbs of trees, whence it procures much of its food, and where it excavates a deep hole for the reception of its eggs. The shafts of the twelve tail-feathers, of which the outer pair are very small, are in the majority of cases stiff and spiny, and therefore well adapted to keep the body close to the bark while climbing; parallel cases being those of the Tree-Creeper (*Certhia*) and the Dendrocolaptinae. The shape of the tail is rounded or cuneate; the wings are moderate and not very much pointed, with ten primaries and from ten to thirteen secondaries. The metatarsus is short, with a single row of anterior scutes; the claws are large, sharp, and curved.[1]

The tongue is excessively long and "worm-like," with horny, barbed tip, and is capable of marvellous protrusion owing to the elongated "horns" of the hyoid apparatus, which in some forms curve round the skull and have their origin near the base of the bill. Facility is thus secured for searching narrow cracks or deep hollows for insects, while the secretion from the large salivary glands secures the adhesion of the objects aimed at. The furcula is U-shaped, the syrinx tracheo-bronchial, the after-shaft rudimentary, while neither adults nor young have down at any stage.

The prevailing colours are green, yellow, black, and white, in various combinations, with spots and bars; brilliant scarlet being commonly present on the crown and frequently also on the back

[1] The hallux is often aborted, producing a tridactylous, instead of a zygodactylous, foot (cf. p. 10).

or under parts. From the males the females and young in first plumage may be distinguished by their duller coloration; but in the intermediate stages of growth the latter exhibit a considerable amount of red. Many species have fine crests.

According to Hargitt[1] the number of genera is fifty, including three hundred and eighty-five fairly defined species; though both genera and species depend chiefly on colour. He mentions *Colaptes* as an instance of the possible formation of races by hybridization or climatic influences, and *Gecinus* as an example of diversely coloured forms, perhaps originating from a common ancestor. The well-known colour-phases of *Dendrocopus major* and of the genus *Iyngipicus* may be mentioned in this connexion; the species becoming larger and whiter as they range eastwards through Central Asia to Japan, and the former also shewing a tendency to a crimson tint on the breast as it nears Africa southwards.

Woodpeckers are, with a few exceptions, solitary woodland birds of a particularly shy and retiring nature, and therefore somewhat difficult of observation. When seeking food they usually ascend a tree in spiral fashion assisted by their tail and claws, and carefully examine every chink or cranny in the bark; on reaching the higher limbs they betake themselves at once to fresh hunting-grounds, often alighting at the very base of a trunk, but equally often flying straight to some promising half-decayed branch. In some cases, however, high flights are essayed. The species of *Colaptes* and *Geocolaptes* feed upon the ground; many forms, such as *Picus martius*, *Gecinus viridis*, and *Melanerpes formicivorus*, prey largely upon ants and take great pains to make a thorough clearance of the nest; the last-named stores up acorns; while *Sphyrapicus varius* and its congeners suck the sap of trees and also hawk for flies: others again devour a large quantity of fruits, seeds, and perhaps even Indian corn. Omitting, however, the sap-sucking propensities of the American species, the harm done is outweighed by the good.

In spring the laughing, ringing, or other cries may be heard in most wooded districts; the sounds being somewhat harsh, and consisting of more or less continuous notes according to the species, while the duration is commonly about thirty seconds. The curious "drumming" noise produced in particular by the Spotted and Black Woodpeckers is also chiefly heard early in the year, though it ceases not with the courting, but when the young

[1] *Cat. Birds Brit. Mus.* xviii, 1890.

are hatched. This sound, which can be heard for a mile, is caused by the bill hammering on the bark—usually of some rotten branch, while the bird's head moves backwards and forwards with extraordinary rapidity; a stationary position, however, is not invariably preserved, nor the quest of food interrupted. The hen sometimes hisses loudly if disturbed upon her eggs; both parents are said to "purr" in certain American species when the hole is interfered with, and they certainly utter continuous, sharp alarm-notes in Britain. It is probable, but perhaps hardly certain, that the female drums as well as the male. The sense of hearing is extremely acute in the Family. The flight is strong and undulating with constant "dips," and when once witnessed can be recognised at considerable distances. Both sexes help to excavate the hole for their eggs, which is a neat circular aperture, worked from the centre outwards, and carried inwards to the core of the wood, to descend thence for at least a foot; as soon as it turns downwards it gradually enlarges, until the whole presents the form of a long-necked bottle. Abortive borings are often made, of considerable depth; while the chips may be found lying at the foot of the tree in a heap, if not removed by the birds, as occasionally happens. Firs, oaks, poplars, beeches, ashes, and willows, both high and low, furnish many breeding places, but wooden walls or towers are also utilized, and two species, mentioned below, bore like Kingfishers in banks. The same hole is occasionally tenanted in successive years, but natural cavities are rarely used. It is commonly stated that Woodpeckers always choose for their excavations decayed or decaying limbs; but the soundest branches, or even the thickest parts of the trunks of huge oaks, are not unfrequently selected. The oval, glossy, white eggs are deposited on a few chips, and usually number from three or five to ten; nevertheless as many as seventy-three are recorded as the produce of one Woodpecker, and forty-two in the case of the Wryneck, when robbed on successive days.[1] Both sexes are known to incubate in certain cases: they sit very closely towards the end of the period, which lasts fourteen days or more, yet often leave their hole quite readily at first. Many species have been tamed, but they are wild and destructive in captivity.

The Family ranges over the greater portion of the globe, except the Australian Region, Madagascar, and Egypt. Its members are

[1] Mr. Abel Chapman (*Wild Spain*, p. 256) says that the Spanish Green Woodpecker breeds twice a year; and its British congener at times does likewise.

most abundant in the Indian and Neotropical Regions, several forms occurring in the Antilles.

Geocolaptes olivaceus, an olive-coloured bird with whitish marks on the wings and tail, crimson rump, and crimson-washed abdomen, is common in the Cape Colony and Natal, and is remarkable for nesting in holes in banks or mud-huts: it feeds upon the ground, and family-parties are stated by Mr. Layard to keep together until the following breeding-season. Similar habits have been observed in *Colaptes agricola* of the Argentine Republic and Patagonia, in timberless districts; but, as the trees grow, it recurs to its natural habits. *C. auratus*, the golden-winged Flicker of North America, has a phase (*C. mexicanus*) found west of the Rocky Mountains and in Mexico, with red coloration of the wings in place of yellow, intermediate races occurring in the intervening regions; considerable controversy has consequently arisen as to whether hybridization has taken place, or whether this is a case of specialized forms of a generalized ancestor, due to climatic or other causes. The colour above is dove-brown with black streaks; the head being lead-coloured with a crimson band on the nape, the rump white, the lower throat black, the under parts pinkish-brown with round black spots, and the wings strongly washed with yellow on both surfaces. The bill is more arched and less wedge-shaped than usual. The food consists of fruit, woodlice, ants, and so forth, much of which is procured upon the earth.

Gecinus viridis, our well-known Green Woodpecker, Yaffle, or Rain-bird, the "laugh" of which is supposed to predict wet weather, is a green bird with yellow rump and red head; the habits being those common to the whole group, though a certain preference is shewn for feeding on the ground or on ant-hills. It ranges throughout Europe to Asia Minor and Persia, while other nearly allied forms, differing in their black occiputs or scarlet rumps, extend over nearly the whole Eastern Palaearctic and Indian Regions. *Chloronerpes* is a Central and South American genus of smaller birds, among which *C. rubiginosus* has golden-rufous upper parts, with a red nape, and yellowish under surface crossed by dark bars. Akin to this is the Ethiopian *Campethera*, *C. punctata* being yellow, olive, and brown above, with a crimson head, and yellow below with small black spots. *Chrysophlegma* extends from the Himalayas to China and the Malay Islands. *C. flavinucha* is about the size of the Green Woodpecker, but

is much yellower, and has a splendid orange crest on the nape, a yellow throat and a grey breast; *C. miniatum* has the crest and upper parts washed with red.

The three-toed *Gauropicoïdes rafflesi* of the Malay countries has a long black crest, and narrow, pointed tail-feathers, which contrast well with its golden back; the under parts are brownish. *Asyndesmus torquatus* of the Western United States has very peculiar hair-like plumage below, in which the first subdivisions of the whitish webs are not again divided; the upper surface is bronzy-green, the front of the head crimson, and the collar white. *Melanerpes* is a large genus with many brilliant forms, which range throughout America; *M. flavifrons* being black above, with white rump, crimson head and breast, broad golden forehead and throat, and brownish chest; *M. candidus* having the head and breast pure white, and the blackish back only relieved by a yellow band on the nape: whereas *M. formicivorus* is intermediate in coloration. The last-named, often called the Californian Woodpecker, extends southwards to Mexico and northwards up the Pacific Coast to British Columbia; it stores up acorns by inserting their upper halves in holes bored in the limbs of trees, which may be sometimes seen studded with them to a height of forty feet or more.[1] Apparently this is done for the sake of the grubs in the acorns; while, as its name implies, the bird also devours ants.

Sphyropicus contains the three Sap-suckers, which together range throughout North America, an individual having strayed to Greenland. *S. varius* shews a striking combination of colours in its black and white back, crimson head and throat, black chest, and yellow breast, while it has the curious habit, shared by its congeners, of puncturing trunks of trees to obtain the sap, in which they delight. Sometimes the entire bole is encircled by these borings.

Nearly all that has already been said of the Family in general, particularly with regard to the "drumming," may be repeated of the Spotted Woodpeckers, of which *Dendrocopus major* and *D. minor* are the British representatives. The colours in this genus are black and white in varied proportions, with crimson on the head and often on the lower parts; a small amount of buff and brown being not uncommonly added, while in *D. brunneifrons*, a

[1] A Mexican species stores acorns in hollow stems of plants, but subsequently sticks them in holes bored in branches. Baird, Brewer, and Ridgway, *N. Amer. Birds*, ii. 1874, pp. 569-572.

Himalayan form, there is an admixture of yellow with the red on the crown. Our Greater and Lesser Spotted Woodpeckers extend throughout Europe and North Asia, and reach the Atlantic Islands; while some thirty congeners widen the range until it includes nearly all the Palaeartic, Nearctic, and Indian Regions. They are also found south of lat. 20° S. in the Neotropical. *D. leuconotus* and *D.* (*Dendrocoptes*) *medius* are other European forms, with varying races. *Picoïdes* is a similarly coloured genus of three-toed birds, with yellow instead of red on the head. They inhabit the most northern forests of both Worlds, reaching southward to Central Europe, China, and (west of the Rocky Mountains) to New Mexico. *P. tridactylus* is well-known in Europe.

FIG. 95.—Lesser Spotted Woodpecker. *Dendrocopus minor.* ×½. (From *Bird Life in Sweden.*)

Iyngipicus is a large group of small species, which stretch from India to the Kuril Islands, Chira, Flores, and Celebes; and, if Hargitt is right in considering *Picus obsoletus* congeneric, from North-East Africa to Senegambia. The colours are black or olive above, relieved by white and fulvescent below with dark stripes or spots, the occiput shewing a band, or two streaks, of red; the lateral tail-feathers, moreover, are hardly rigid, approaching in that respect those of *Picumnus*. *Dendrobates* is a still larger genus of similarly sized birds, varying from nearly uniform olive with a red crown, or bright red with white under parts, to dull gold-colour, where the lower surface is buff barred with brown; the head being in the last case red, but the nape yellow. They range from Northern Argentina to Central America. *Mesopicus goertan*, one of half a dozen finely-coloured species found throughout most of the Ethiopian Region, has an olive back, long crimson feathers on the head and rump, and a greyish breast.

Thus far all the members of the Family agree in having the nostrils covered with bristles. Among those in which the bristles are wanting may be mentioned *Celeus* and the three-toed *Tiga javanensis* and its congeners, extending from India to Cochin China. The last-named has a brilliant golden-orange back, a crimson

head, crest and rump, black tail, neck and wings, and dark brown under parts with white spots. *Celeus* ranges from Mexico to South Brazil, *C. flavus* being canary-yellow with brown tail and wings, a large crest of the former colour, and a crimson stripe at the gape. This genus, and the five following, are characterized by having the neck extremely narrow and compressed.

Campephilus, ranging from the Gulf States and the Lower Mississippi to Argentina, and *Ipocrantor*, of Chili and Patagonia, are noticeable for the concave ends of their tail-feathers. *C. principalis*, the Ivory-billed Woodpecker of the Southern United States—almost the largest member of the Family — frequents the highest timber, where, according to Wilson, it used to strip off cart-loads of bark, and make huge quantities of chips. It appears, however, that it only attacked trees infested by insect-larvae. When it was common the Indians used the head as a charm, and considered that it gave them the creature's courage. Its main colour is bluish-black with white wing-markings; the crimson and black occipital feathers together forming a long crest. Both this bird and the Pileated Woodpecker of North America (*Dryotomus pileatus*) are locally known as "Log-cocks," with which name may be compared that of "Stock-eagle," *i.e.* "Stump-eagle," given in the West of England to the Greater Spotted Woodpecker. *Ipo-*

FIG. 96. — Great Black Woodpecker. *Picus martius*. $\times \frac{1}{5}$. (From *Bird Life in Sweden*.)

crantor magellanicus, of Chili and Patagonia, has an even longer crest. *Hemicercus* is a genus of curious little crested black and white species, with very short and hardly rigid tails, occurring in India, the Malay countries, and Cochin China. *Hemilophus pulverulentus*, a larger bird of similar range, is remarkable for its enormous bill and curious dusty-looking slaty plumage.

Under the head of *Picus*, which gives the Family its name, is placed by Hargitt only *P. martius*, the Black Woodpecker, an inhabitant of the pine-forests of Europe and Asia to Japan, quite erroneously asserted to have occurred in England. The colour is black with the exception of a red head, while the feathering extends down two-thirds of the metatarsus in front. It feeds chiefly on ants, insects, and their larvae, utters a loud rattling cry, drums on trees, and lays four or five eggs in holes bored in rotten wood.

The Piculets are considered by most writers to form a Sub-family *Picumninae*, and connect the *Picinae* and the *Iynginae*, being the least specialized of the former; they constitute the genus *Picumnus*, of which the thirty or more members have short, rounded tails without spiny shafts, and nostrils hidden by bristles. These diminutive birds occupy America from Honduras to Northern Argentina, as well as most of the Indian Region, one being a native of Africa; they are duller than most Woodpeckers, and are rufous, olive, or greyish, while often marked with black, or with red or yellow on the head. *P. mieromegas* is confined to Hispaniola, *P.* (*Verreauxia*) *africanus* to the Gaboon districts, *P.* (*Sasia*) *ochraceus* and its two congeners are found in Northern India and the Malay countries. Of these only the first has any bright colour on the head. *Sasia* lacks the hallux.

Sub-fam. 2. *Iynginae*.—The Wrynecks may be distinguished from the typical Woodpeckers by their soft tails without spiny shafts, and naked nostrils with a partial covering. The plumage shews a peculiar mixture of black, brown, grey, and white, somewhat similar to that of a Nightjar. They feed chiefly upon the ground on ants and the like, and do not seek for insects under the bark of trees to the same extent that Woodpeckers do; while, instead of cutting out their own nesting-hole, they utilize cavities in stumps, posts, or even banks, to contain the white eggs, from five to ten in number, and often choose the same site annually. These birds have a curious habit of erecting the head-feathers and twisting the head itself from side to side, or almost over the back, either when sitting quietly on a branch or when molested. They

utter a loud, triple note, frequently reiterated, which has been compared to that of the Kestrel, and somewhat resembles the spring cry of the Nuthatch. Owing to the non-spinous tail the members of this genus cannot climb so well as Woodpeckers, while on the ground they are awkward and move with constant hops. The extensile and worm-like tongue is not barbed at the tip. *Iynx torquilla*, the Cuckoo's-mate or Snake-bird, is fairly common in

FIG. 97.—Wryneck. *Iynx torquilla*. × $\frac{2}{3}$. (From *Natural History of Selborne*.)

England, and extends thence to Japan, Kordofan, and Senegal. The remaining species are all Ethiopian, *I. pectoralis* with a reddish-brown fore-neck and chest inhabiting the southern half of Africa, the similar *I. pulchricollis* occurring in East Equatorial Africa, and *I. aequatorialis*, in which the red extends to the whole breast, being met with only in Abyssinia.

Of fossil forms referred to this Family, *Uintornis* occurs in the Eocene of the United States, while *Picus* and *Homolopus* have been found respectively in the Lower and Middle Miocene of France.

CHAPTER VII

NEORNITHES CARINATAE *CONCLUDED*

BRIGADE II—LEGION II (CORACIOMORPHAE *CONCLUDED*)
ORDER: PASSERIFORMES

Order XIV. PASSERIFORMES.

This Order contains about five thousand five hundred species, being more than half the birds yet known. Their classification is attended with much difficulty, and the anatomy of many more forms must be investigated before anything approaching a satisfactory—not to say final—scheme can be proposed. The earlier taxonomers often based their systems largely on European genera, and were therefore obliged to interpose others, or even to recognise new Families, as their knowledge extended, among the many new discoveries, to various American and Australian forms.

The foundation of recent arrangements of the group, depending on the number or position of the song-muscles, was laid between 1845 and 1847 by Johannes Müller, who divided the then generally accepted Order *Insessores* into three tribes: (1) *Oscines* or *Polymyodi* [Song-birds, or those with many (usually five or seven) pairs of song-muscles]; (2) *Tracheophones* [where the bronchi take no part in the formation of the voice-organ]; and (3) *Picarii* [corresponding in the main to Nitzsch's *Picariae*]; the two former of which included most of the Passerine forms. Simultaneously with Müller, Cabanis proposed a system grounded on similar principles; while in 1867 Huxley recognised of his group *Coracomorphae* the divisions *Polymyodae, Tracheophonae,* and *Oligomyodae* [birds with few song-muscles]. About ten years later Garrod, who was followed between 1880 and 1882 by W. A. Forbes, divided the Passeres into *Desmodactyli,* with a band joining the muscles of the

hallux to the front toes, and *Eleutherodactyli*, where the hind toe is free. The former contained only the *Eurylaemidae*; the latter the *Mesomyodi* (where the syringeal muscles join the bronchial semi-rings in their middle or lateral portion), and the *Acromyodi* (where they are attached to the extremities). The subdivisions need not be discussed here; but it should be noticed that, as opposed to Müller, the attachment, and not the number, of muscles was the point relied upon. Want of space forbids an account of the subsequent labours of Mr. Sclater,[1] Professors Newton[2] and Fürbringer,[3] and others; but the last-named no doubt influenced considerably the views of Dr. Gadow, mainly accepted below. This author[4] takes into consideration not only the attachment, but also the disposition of the muscles of the syrinx, and distinguishes his *Passeriformes* as (1) *Passeres anisomyodae*, where the syringeal muscles are unequally inserted, either in the middle, or upon the dorsal or ventral end only, of the bronchial semi-rings; (2) *Passeres diacromyodae*, where some of the muscles are attached to the dorsal, and some to the ventral ends. The former of these groups may be subdivided into A. *Subclamatores* and B. *Clamatores*; the latter into C. *Suboscines* and D. *Oscines*. Even the groups (1) and (2) are expressly stated not to rise to the rank of Sub-Orders, while the *Oscines* and other equivalent divisions are of hardly more than Family value.

The great number of species in the Order *Passeriformes* makes it necessary to treat the various sections less fully than has been the case in the foregoing portion of the work, while the Families are not, of course, on the same level here as elsewhere.

1. Passeres anisomyodae.

A. *Subclamatores.*

Fam. **Eurylaemidae.**—The Broad-bills, a curious Old World group, have been by various authors regarded as allied to the Rollers or to the Flycatchers. They are distinguished from all other Passerine forms by the fact that the hallux is connected with the front toes by a vinculum or band joining the deep plantar tendons, and is thus incapable of independent motion. The beak is very

[1] *Ibis*, 1880, pp. 340-349. [2] *Dict. Birds*, 1896, Introduction.
[3] *Untersuchungen zur Morphologie und Systematik der Vögel*, Amsterdam, 1888.
[4] Bronn's *Thier-Reich*, *Aves. Syst. Theil*, 1893, pp. 270-273.

broad, while it is comparatively small in *Calyptomena*; *Corydon*, and to a less extent *Eurylacmus* and *Sarcophanops*, have a decided terminal hook to the maxilla. The metatarsus is scutellated in front and smooth behind (laminiplantar); the hallux is weak; the third and fourth toes are distinctly united, the claws are very short. The moderate wings have ten primaries in *Calyptomena*, eleven elsewhere, *Eurylaemus* having the eleventh very small; the secondaries are nine or ten; the tail of twelve rectrices is usually long and rounded, but is graduated in *Psarisomus*, short and square in *Calyptomena*. The adults have no aftershaft or down, the tongue is sagittate, and *Sarcophanops* has naked orbits. The plumage in *Calyptomena viridis* of the Indo-Malay countries is bright green, with a large black post-auricular and a yellow pre-ocular spot, three black bars on the wing-coverts, and blackish wing- and tail-quills. The duller female has no black spots or bars. The dense frontal feathers project forward over the beak. *C. whiteheadi* of Borneo has a black throat. These somewhat inactive birds inhabit thin jungles, utter soft whistles, and feed on fruit; the rest of the Family eat little but insects, though *Cymborhynchus macrorhynchus*, the Rain-bird of the Malays, enjoys berries.

Fig. 98.—Broad-bill. *Calyptomena viridis*. $\times \frac{7}{16}$.

Eurylacmus javanicus is blackish, with yellow markings on the back, tail, and wings; the head, neck, and under parts being vinous purple, with a black crescentic chest-band, which is absent in the hen. *Corydon sumatranus* is black, with a white alar bar and a buffish-white throat and fore-neck. They cover much the same area as *Calyptomena*. *Cymborhynchus* shews black and crimson colours, while the beautiful *Psarisomus dalhousiae*, found from the Eastern Himalayas to Borneo, has a green back and under

surface, black and blue head and wings, yellow face and throat, and blue tail becoming black below. *Serilophus* contains two grey-brown species with chestnut rumps, ranging from Sikkim to Tenasserim. *Sarcophanops* is peculiar to the Philippines.

The quiet and solitary Broad-bills inhabit forests, thickets, and gardens, flying little, sitting sluggishly on the branches, taking insects on the wing, and uttering whistling or metallic notes. They make large roughish oval nests, with a large entrance near the top often protected by an overhanging roof, while a sort of tail is commonly added; these are suspended from low branches or plants close to water; the materials being twigs, roots, tendrils, moss, or leaves, felted together and smoothly lined with green foliage, flags, bamboo-spathes, or grass, sometimes renewed when dry. From three to five eggs are laid, pale yellowish in *Calyptomena*, white or rarely spotted with red in *Psarisomus*, and pinkish, buff or white elsewhere, with markings varying from black to rufous.

B. *Clamatores.*

This group includes the *Pittidae, Philepittidae, Xenicidae, Tyrannidae, Oxyrhamphidae, Pipridae, Cotingidae, Phytotomidae, Dendrocolaptidae, Formicariidae, Conopophagidae,* and *Pteroptochidae.*

Apparently the furcula is U-shaped; the tongue varies; the aftershaft is small, if present; the down is sparing or absent.

Fam. I. **Pittidae.**—The members of this Old World Family, nearly fifty in number, range from India to North China, East Australia, New Guinea, and New Britain; while one species is West African. They are stout, strong-billed forms, with short rounded wings and tail, the long metatarsus being more or less scutellated all round; the primaries number ten—the outer being decidedly long—the secondaries eight, the rectrices twelve. The plumage exhibits vivid scarlet, blue, and green tints, in addition to yellow, purple, black, brown, and white; elongated neck-feathers occur in *Anthocincla*, erect frontal plumes in *Coracopitta*. The tail in *Pitta* is nearly square, but is pointed in *Eucichla* and *Coracopitta*. The habits seem to be fairly uniform, all the species haunting thickish jungle or dense scrub, whether in the rock-strewn glens of India, or the damp Malayan, Australian, and Papuasian forests. The birds are more often heard than seen, though the plaintive, oft-repeated double whistle of the smaller forms, or the mournful, triple cry of the larger, is seldom audible in the mid-day heat,

both being recognisable by the long-drawn final syllable. They are chiefly terrestrial, and jump from rock to rock or branch to stump with great agility; their apparently leisurely movements being really so quick that a mere glimpse is usually obtained through some opening in the foliage, while their habits are consequently difficult to observe. The quiet watcher may, however, hear the birds pattering over the beds of leaves, and see them hunting for molluscs and insects, or digging for worms and ants, but the slightest movement causes them to depart with long rapid hops, exchanged under pressure for a low, direct noiseless flight of short duration. Pittas are habitually, though not invariably, solitary, and are especially shy when breeding. *P. moluccensis* ascends the trees to call, *P. oatesi* occasionally whistles at night, while *P. novae guineae* flirts its tail like a Wagtail. The exposed nest, with its lateral entrance, is frequently placed on the ground at the foot of a tree or shrub, but sometimes amongst undergrowth or in very low forks; it is a rounded fabric of twigs, roots, bark, moss, leaves, and grass, often cemented with earth; the larger species making a clumsier and looser structure, the smaller a more compact mass. Unspotted eggs are rare, the usual colour being creamy-white with brown, reddish, grey, or purplish-black spots or scrawls; the number is from three to six. *Anthocincla phayrii* and *Pitta cucullata* are said occasionally to build a platform of sticks before their doorway, and the latter a projecting roof over it. The former species, which inhabits Burma, is brown with a black coronal streak, black and white superciliary stripes, white throat, and pink vent; *Pitta caerulea* is bright blue above, with black occiput and nape, but an otherwise ashy head; it is greyish-buff below, with a partial black collar. The female

FIG. 99.—*Pitta brachyura*. $\times\frac{3}{4}$.

has a brown back, and a buffish head, with black cross-bars and collar. This very large form ranges from Tenasserim to Sumatra and Borneo; the smaller *P. cyanea* of Bhutan, Burma, and Siam is somewhat similar, but has a scarlet nape, and bluish under parts with black bars. *P. maxima* of Gilolo is glossy black, with blue wing-coverts, a white alar bar, green edges to the secondaries, white lower surface, black chin, and crimson belly. *P. granatina* of Borneo is purplish-black, with scarlet occiput and nape, blue superciliary stripe, some blue on the wing, purplish throat, and scarlet belly. *P. baudi* of the same island is crimson above, with blue crown and tail, black nape, and white alar bar; the lower parts being black, with purple and blue abdomen: the female is dull brown below. *P. cyanoptera,* reaching from Burma and Borneo to South China, is dull green above, with a dark central stripe and a black margin to the brownish crown; the black wing shews a white bar, and azure on the coverts; the tip of the black tail and the rump are blue; the lower surface is buff, with crimson on the belly. Several species have green under parts, a blue pectoral band, or no blue on the rump and wings. *P. angolensis* inhabits West Africa, *P. nympha* North China and Tsu-shima Island, *P. iris* and *P. strepitans* Australia: the latter reaches New Guinea, where it meets, among other forms, the entirely black *Coracopitta lugubris,* as well as *P. macklotii,* which extends to New Britain.

Fam. II. **Philepittidae.**—This contains only the two species of *Philepitta,* peculiar to Madagascar, which have bare orbits surmounted by a green carunele in the male, and metatarsi with a regular series of scales behind (taxaspidean). *P. jula* is black, with yellow at the bend of the wing: the female is olive-green with yellow markings below. *P. schlegeli* is green above and yellow below in

Fig. 100.—*Philepitta jula.* ⅔.

both sexes, the male having a black head, the female white streaks on that part. The outward form and habits recall those of *Pitta*, but the latter are more arboreal. The young are apparently spotted, unlike those of the Pittidae, which resemble the adults.

Fam. III. **Xenicidae.**—This contains the genera *Acanthidositta* and *Traversia*, each with one species, and *Xenicus* with two; they are remarkable New Zealand forms, in which the weak syringeal muscles only reach the lowest tracheal ring. The slender metatarsi are almost smooth, the claws acute and elongated; the short rectrices number ten, and the tenth primary is nearly equal to the next; the secondaries are eight. The tongue is lanceolate and horny. The stout-billed, long-legged *Xenicus longipes* has dark green upper parts, a brown crown, a yellowish rump and sides, black cheeks, whitish superciliary stripes and throat, and silky, bluish-grey under parts. The female is chiefly brown. *X. gilviventris* is olive-brown on the back and cheeks, and purplish-brown beneath, with some rufous and a black spot on the wing. Both forms inhabit the South Island, and are called "Bush-Wren" and "Rock-Wren" respectively. The former frequents dark sub-alpine forests, restlessly searching the trees for insects, their chrysalids and larvae, and uttering a weak note or a trill. It is seldom seen on the ground, yet flies but little, as might be expected from its short, rounded wings. The compact domed nest of moss, placed in low forks or in tree-roots, contains five or six white eggs with pink blotches; when built in holes it is open. The other species lives among débris high up the hills, being almost entirely terrestrial, skulking round the boulders, and eating dragon-flies, lepidoptera, and insects generally, with scraps of fat from any traveller's camp. The nest of roots, twigs, and leaves, lined with feathers, is placed in crevices, and contains some five white eggs. The similar *Traversia lyalli* of Stephens Island is said to be nocturnal. *Acanthidositta chloris*, the Rifleman, is dull green above with yellower rump, and fulvous white below; the moderate wings are blackish, with green edgings and yellow bars; the eye-stripe is white; the short rounded tail is black with light tip. The female has an olive upper surface with brown markings, a yellow rump, and buffish under parts. This species inhabits the hill-forests of both the main islands of New Zealand, where it actively searches the trees for food with quivering wings, and utters a feeble "cheep." The more or less bottle-shaped nest, placed in holes in trees,

buildings, and so forth, is formed of bents, roots, and feathers, and contains from three to five white eggs.

Fam. IV **Tyrannidae.**—This comprises some four hundred species, chiefly of an olive or black-and-grey coloration, which is occasionally relieved by bright scarlet as in *Pyrocephalus*, orange-red as in *Muscivora*, or yellow as in *Todirostrum*; but these hues are not necessarily common to whole genera. *Agriornis* and *Megarhynchus* are exceptionally large forms, but the majority are small, and in habits and appearance resemble the Old World Flycatchers, or even Shrikes. From the former, however, they are easily distinguished by their normal outer primary and the exteriorly scutellated back of the metatarsus (exaspidean). Dr. Sclater [1] recognises four Sub-families, *Taeniopterinae, Platyrhynchinae, Elaineinae*, and *Tyranninae*.

The curved bill, varying in length and stoutness, is compressed and bristly at the gape in the Taeniopterinae, hardly bristly in the Elaineinae, depressed and decidedly bristly in the Platyrhynchinae and Tyranninae; while the culmen is most strongly hooked in the larger species, being much curved in *Oncostoma*, particularly broad and flat in *Platyrhynchus, Megarhynchus, Muscivora, Todirostrum*, and *Euscarthmus*, swollen and very wide in *Rhynchocyclus*. In the first and last of the Sub-families the metatarsus is strong and often long; in the remainder it is comparatively weak; *Centrites* has an extremely elongated hallux, correlated with Lark-like habits. The wing is usually short, but is often long in the Taeniopterinae and Tyranninae; the outer of the ten primaries are at times acuminate in *Tyrannus, Hapalocercus, Cnipolegus*, and *Taenioptera*, whereas in *Colopterus* and *Alectrurus* these quills are unusually reduced. The secondaries are nine. The tail, normally of twelve rectrices, varies much in length, and is very deeply forked and graduated in *Milvulus, Muscipipra*, and three members of *Tyrannus*, moderately divided in *Contopus* and certain species of *Taenioptera*, and so forth: it is not infrequently nearly square; while it is long and rounded in *Capsiempis* and the like; long and graduated, with only ten narrowly-barbed feathers in *Culicivora*; of the same shape in *Cyberuetes*; and excessively reduced in *Orchilus caudatus*. *Copurus* possesses two very long median rectrices; the male of *Alectrurus tricolor* has the two fairly long outer feathers with their inner webs abnormally developed, and that of *A. risorius* has them enormously lengthened and broadened.

[1] *Cat. Birds Brit. Mus.* xiv. 1888.

The Taeniopterinae, which are generally black, grey, and white, frequent the open parts of wooded districts, river-sides, or exceptionally marshes, in South America, a few of them extending north of Panama; the Elaineinae and Platyrhynchinae are olive, grey, brown, and yellow, and inhabit dense forests from South Mexico to Patagonia, *Ornithion imberbe* ranging as far north as Texas; the Tyranninae—with many large species—normally exhibit olive, grey, yellow, or white in varying proportions, and include most of the Nearctic genera, such as *Contopus*, *Empidonax*, *Myiarchus*, and *Tyrannus*, as well as many Neotropical forms, and the entirely Antillean *Blacicus* and *Lawrencia*. Erectile crests occur in some cases in *Tyrannulus*, *Cnipolegus*, *Colopterus*, *Pseudotriccus*, *Lophotriccus*, *Machetornis*, *Muscivora*, *Empidonax*, *Anaeretes*, *Elainea*, *Pyrocephalus*, *Myiobius*, and *Mitrephanes*; white eye-rings are found in *Euscarthmus zosterops*, *E. orbitatus*, and *Capsicmpis orbitalis*; a fleshy yellow caruncle surrounds each eye in *Liehenops*; and in the breeding male of *Alectrurus risorius* the throat and cheeks shew bare orange skin.

The following are examples of the coloration, which is often similar in both sexes. *Tyrannus pipiri*, the King-bird of temperate North America, ranging to Peru in winter, is dark grey, with a concealed orange patch on the black crown, black and white wings and tail, and white under parts. *Pyrocephalus rubineus*, of South America north of Buenos Aires, is dark cinereous with crimson head and lower surface, the female being grey above, and chiefly white below with grey stripes. *Muscivora regia* of Guiana and Amazonia is brown, with a scarlet crest tipped with purplish, and has ochraceous under parts with brownish bars. The crest is yellower in the hen. *Megarhynchus pitangua*, of Central and South America to Paraguay, is brown, with yellow lower surface, a black head, white superciliary streaks joining on the nape, a concealed orange coronal patch, and a white throat. *Elainea pagana*, ranging from South Mexico to Brazil, is dull olive above, and greyish-white below with yellow belly; a spot on the crown and two alar bars being white. *Cyanotis azarae* of La Plata, Chili, and West Peru has bronzy-green upper and yellow lower surface, with a partial black band beneath and a crimson vent; the head is black with a crimson spot, the wings and tail are black and white. *Todirostrum cinereum* of Central America and eastern South America is greyish above and yellow below, with black crown, wings, and tail, the primaries having yellow edges and

the tail a white tip. *Taenioptera dominicana*, of South-East Brazil and Argentina, is white with the wings and tail mainly black: *Cnipolegus unicolor* of Upper Amazonia is uniform black.

Tyrants are active and restless birds, chiefly met with near rivers or marshes, where they are constantly seen sitting alone on the branches of trees, bushes, dead thistles, and giant pampas-grasses, or more rarely, as in the Chat-like *Muscisaxicola*, on clods and boulders; thence they dart, like Flycatchers, upon their prey. *Centrites* frequents bare plains and loves the ground; *Serpophaga* and *Sayornis* haunt streams, and flirt the tail like a Wagtail; *Fluvicola*, *Alectrurus*, and *Cyanotis* inhabit reed-beds, and climb about the bending stems in Tit-like fashion; the Taeniopterinae are mainly terrestrial, and often form flocks, *Myiotheretes* running and flying like a Thrush, and even accompanying bands of Plovers; *Machetornis* searches the backs of cattle for insects, and dusts itself like a Lark. Many members of the family are decidedly shy, but the majority are otherwise, and in especial the Tyranninae, which are excessively bold and pugnacious when breeding, attacking even the Carrion-Hawk (*Milvago*), and bullying their smaller relatives. In a fair number of species the sexes are usually observed apart; in others they are as invariably in company. The range extends to ten thousand feet or more in the Andes, *Muscisaxicola marloviana* being found at that altitude, as well as down to the sea-coast in Patagonia; while in some cases semi-migratory movements take place at certain times of year. The powers of wing are commonly great, especially in the agile King-bird and its congeners; *Taenioptera* and *Agriornis* can fly as well as hop; *Centrites*, though of terrestrial habits, moves swiftly or circles easily in the air; *Pitangus* and *Empidonax minimus* quarter the ground for food with undulating movements. *Pyrocephalus rubineus* soars with upraised vibrating wings to a considerable height, with many a rise and fall; *Alectrurus tricolor* goes slowly and vertically up with rapid pulsations of the pinions, and then comes slanting down; while the graceful Scissor-tail (*Milvulus*) twists and turns about in the air, alternately opening and shutting its long forked rectrices, or whirling aloft at will to dart earthwards again like a rocket. The usual note is shrill, piercing, and often harsh or angry, as in *Tyrannus*, *Myiarchus*, and *Machetornis*; it is loud, grating, and rarely mellow, in *Pitangus* and *Cyberuetes*; a low plaintive whistle or pipe is uttered by

Myiotheretes, *Cyanotis*, and most of the Taeniopterinae, *Sayornis* having a ringing cry, supposed to resemble "Phoebe," which name it bears in North America, and *Fluvicola* and *Cnipolegus* giving vent to clicking sounds. Many species twitter, chirp, or chatter, while *Pyrocephalus rubineus*, *Hapaloecercus flaviventer*, *Ornithion imberbe*, *Contopus ardesiacus*, and *Empidonax flaviventer* are stated to have a pleasant trill approaching a song. These notes may be uttered by the birds either when soaring in the air or when stationary. The food normally consists of insects, caught upon the wing with an audible snap of the bill; but *Taenioptera* often, instead of hawking from a perch, pounces upon crawling beetles, grasps them in its claws, and devours them upon the earth. *Pitangus bolivianus* and some other forms even eat mice, young birds, small snakes, lizards, fishes, frogs, spiders, molluscs, worms, and insect-larvae, beating the larger creatures upon a branch to kill them. *Elainea strepera*, *Myiarchus erinitus*, and some species of *Tyrannus*, will eat berries and seeds. A bulky nest is often fashioned of rough twigs, moss, grass, straws, wool, hair, and rags; which may be open as in *Tyrannus*, or domed as in *Pitangus bolivianus*, and placed in trees in either case: or it may be beautifully felted with moss, lichens, and spiders'-webs, and lined with hair and feathers, as in *Elainea* and *Serpophaga*. *Sayornis* commonly makes a foundation of mud pellets, adding coarse materials above with feathers for bedding, the fabric being fixed to rocks or buildings. Again, many species build slight or fairly compact nests of grass, twigs, and softer materials

FIG. 101.—Scissor-tail. *Milvulus tyrannus*. $\times \frac{2}{7}$.

in bushes, forks, or outgrowths of trees. *Copurus*, *Taenioptera*, *Machetornis*, and *Myiarchus* commonly use old holes of Woodpeckers; *Todirostrum* and *Fluvicola* often make hanging purse-like structures; *Cyanotis* attaches its conical nest of papery reeds to the stems of those plants; *Serpophaga* frequently suspends its domicile to twigs, roots, or grasses overhanging water; *Alectrurus*, *Lichenops*, *Hapalocercus*, and *Centrites* build in rush- or grass-tufts, and *Muscisaxicola* under stones. *Taenioptera* and *Machetornis*, moreover, will lay in the "ovens" of *Furnarius*, or in the nests of *Anumbius acuticaudus* (pp. 486, 487). *Muscivora mexicana* makes a curious hanging spindle-shaped nest, surrounded by loose materials. The eggs are usually whitish, salmon- or cream-coloured, and may be unspotted, or dotted and ringed with red, purple, or brown; those of *Pyrocephalus rubineus* have black and grey markings, those of *Machetornis* dense brown stripes or spots, those of *Myiarchus* tangled purple or red-brown lines and marblings, while those of *Centrites niger* are plain bluish-green.

Fam. V. **Oxyrhamphidae.**—The members differ from the *Tyrannidae* in the straight bill, and the serrated outer web of the tenth primary of the male. The sole genus *Oxyrhamphus* has three greenish forms, with red crests, and black-spotted yellow or white lower parts.

Fam. VI. **Pipridae.**—The Manakins, often considered a subsection of the Cotingidae, are for the most part small thick-set birds, though *Heteropelma* and some other genera have greater dimensions. The seventy or more species may be divided into the Sub-families, *Piprinae*, with brilliant males, and *Ptilochlorinae*, where the sexes are usually dull-coloured and similar;[1] the former ranging from South Mexico to North Argentina, the latter to South-East Brazil. The curved bill is generally short and wide at the base in the Piprinae, with an indistinct terminal notch; but is somewhat elongated, much compressed, decidedly notched, and usually provided with rictal bristles in the Ptilochlorinae. The metatarsus is exaspidean (p. 473)—though nearly smooth in *Metopothrix* and *Masius*—and is comparatively slender in most of the Piprinae, stronger in the Ptilochlorinae, *Piprites*, and *Ceratopipra*; the outer and mid-toes being partially united. The exterior of the ten primaries is always short, while the wing is much elongated in *Chloropipo*; the secondaries are nine or ten.

[1] Cf. Sclater, *Cat. Birds Brit. Mus.* xiv. 1888, p. 282.

In the males of some forms the remiges differ from those of the females; thus the shafts of the primaries are thickened and pointed in *Chiroxiphia*, similar but incurved in *Helicura* and *Chiromachaeris*, with much attenuated barbs in the latter; in *Ptilochloris* the seventh primary is modified and bends outwards. In *Machaeropterus* the wing-bones are flattened; the secondaries have thick stems bending inwards towards the tip, and shew reduced vanes, save the eighth and ninth, while the sixth and seventh have the shaft terminally developed into a horny excrescence. The tail is usually short and square, but is long in *Chloropipo* and *Metopia*; rounded in the latter and *Masius*, graduated in *Metopothrix* and *Heterocercus*. The outer of the twelve feathers are much elongated in *Cirropipra*, being acuminate in *C. heterocerca*, curved and filiform in *C. filicauda*; the two median rectrices are lengthened in *Helicura*; while in three species of *Chiroxiphia* they are also long, or even linear in *C. linearis*. Frontal crests occur in *Metopia*, *Masius*, and *Metopothrix*; vertical crests in *Pipra serena*, *P. suavissima*, and four species of *Chiroxiphia*; *Ceratopipra* has a peculiar extended nuchal tuft, *Chiromachaeris* an elongated beard.

As examples of coloration we may take the following:—*Chloropipo flavicapilla* has a yellow head, neck, and under parts, a green back, and brownish wings; *Xenopipo atronitens* is uniform black; *Ceratopipra cornuta*, black with scarlet head, neck, and thighs; *Cirropipra filicauda* similarly coloured, with yellow forehead and lower surface. *Pipra leucocilla* is black with a white crown; *P. velutina* has a blue cap, *P. suavissima* an erect white vertical crest, lilac rump, and orange mid-abdomen. *Machaeropterus regulus* exhibits green upper parts, a scarlet crown, slaty wing- and tail-quills, and white, green, and rufous under surface. *Chiroxiphia pareola* is black, with blue mantle and crimson crest; *Chiromachaeris aurantiaca* is also black, with orange nuchal band, cheeks and breast, green rump, and yellow abdomen. The females are green, with yellowish or whitish tints below. *Ptilo-*

FIG. 102.—Manakin. *Pipra mentalis*. $\times \frac{1}{2}$.

chloris squamata is in both sexes olive-green, with blackish cap and wings, and yellowish under parts marked with black; others again of the Ptilochlorinae are chiefly olive or rufous,[1] three species of *Hetteropelma* having concealed coronal patches of yellow.

Manakins as a rule inhabit deep forests, or thick undergrowth near marshes, where they incessantly creep about the branches like Tits, and take short flights after passing insects. *Chiroxiphia caudata* is called in Brazil the "Fandango-bird," from the fact that one individual often sits and sings, while its fellows dance up and down to the music. Two males of *C. linearis* have been seen skipping before a female, and uttering meanwhile their cry of "to-le-do." *Chiromachaeris* makes a sound like a whip cracking, followed by a continuous rattle—possibly caused by the wings; but this noise seems peculiar to the genus, the usual cry being loud and whistling. Fruits of all sorts, especially berries and seeds, and occasionally insects, form the food. *Chiromachaeris manacus* and *Chiroxiphia caudata* hang loose, shallow nests of grass—the latter with slight additions of wool, hair, tendrils, and leaves—from the forks of low shrubs; the two eggs being reddish- or yellowish-white, thickly blotched with red or brown.

Fam. VII. **Cotingidae.**—This group, divided by Mr. Sclater[2] into the Sub-families *Tityrinae*, *Lipauginae*, *Attilinae*, *Rupicolinae*, *Cotinginae*, and *Gymnoderinae*, contains more than a hundred species; but the *Attilinae* are sometimes placed in the Tyrannidae or the Formicariidae, *Iodopleura* and *Calyptura* in the Pipridae. The range extends from South Mexico to Argentina, *Carpodectes* being restricted to Costa Rica and Nicaragua, *Phoenicocercus*, *Haematoderus*, and *Gymnocephalus* to Guinea and Amazonia, *Doliornis* to Central Peru, *Tijuca*, *Phibalura*, and *Calyptura* to South Brazil.

The bill varies from strong, elongated, compressed, and curved, as in *Tijuca*, the Tityrinae and Attilinae, to short and broad, as in *Phibalura*, *Querula*, and *Chasmorhynchus;* the culmen being particularly elevated in *Gymnoderus*, and much hooked in the Attilinae. The metatarsus, scutellated in front, and usually covered with small round scales behind (pycnaspidean), is especially strong in *Pyroderus* and *Rupicola*, partly feathered in the latter, and posteriorly corrugated in *Lipaugus;* while *Attila* and other kindred forms have the outer toes some-

[1] *P. buckleyi* has curious long filaments on the head of the young. Sclater and Salvin, *P.Z.S.* 1880, p. 158. [2] *Cat. Birds Brit. Mus.* xiv. 1888, p. 326.

what connected. The wings may be long, as in *Carpodectes* and *Iodopleura*, or short as in *Phoenicocercus* and *Calyptura*; the ten primaries, of which the outer is small, are much reduced and twisted in *Chirocylla*—particularly in the male; in that sex of *Rupicola* some have the inner web cut away at the tip, while the external secondaries have the outer vanes filamentous; the Tityrinae have the ninth primary abbreviated and often scimetar-shaped; the seventh has a terminal horny process in the male of *Phocnicocercus*. The secondaries are ten or eleven. In *Xipholena* the greater coverts are stiff and elongated. The tail of twelve rectrices is usually moderate and square; though very short in the Cotinginae, long in *Tijuca*, deeply forked in *Phibalura*, and nearly hidden by its coverts in *Cotinga amabilis*. Bristles surround the gape in the Lipauginae and Attilinae, but vary elsewhere; *Rupicola* has a large compressed crest, *Cephalopterus* (Fig. 103), one like an umbrella, *Phocnicocercus*, *Doliornis*, *Heliochera*, *Calyptura*, and *Phibalura* moderate tufts. Wattles and naked areas occur in *Chasmorhynchus* and *Cephalopterus*; some species of *Tityra* have the lores and orbits bare; *Gymnoderus* has the sides of the head and the whole neck, *Gymnocephalus* the entire head unfeathered.

The plumage is ordinarily plain rufous, green, or grey; the females being nearly always dull, though many of the males are very brilliant. Among these *Tityra* exhibits black and white hues, *Hadrostomus* is chiefly grey or black, with a rosy band below in three cases, *Pachyrhamphus* is green, black, yellow, rufous, or grey, sometimes varied with white. *Lathria streptophora* has a pink collar, *Aulia* irregular black spots below. *Phoenicocercus carnifex* is dark brown, with scarlet crown, rump, most of the tail and under parts; *Rupicola crocea*, the well-known Cock of the Rock, is bright orange, with brown and white wings and partly blackish rectrices; *Phibalura flavirostris* is black and yellow with concealed scarlet crest; *Tijuca* is black, with yellow on the wing; *Ampelion* is green, relieved by brown, black, and yellow; *Pipreola* is green, with black, scarlet, yellow, or orange markings on the throat or breast; *Cotinga* exhibits splendid blue and purple tints; *Xipholena pompadora* has an unusual reddish-purple hue, coupled with almost white wings. *Carpodectes* is snowy white, with leaden-coloured or yellow bill; *Heliochera* has black, grey, white, or yellow coloration, with a chestnut crest; *Iodopleura* shews a lilac tuft on each side of the breast; and *Calyptura*

is chiefly greenish-yellow, with a scarlet, black-edged crest. Of the peculiar Gymnoderinae, *Haematoderus*, which has elongated head-, neck-, rump-, and breast-feathers, is crimson with brown wings and tail, the female having brown on the back; *Querula* is dull black with a red collar of lengthened plumes; *Pyroderus* is black with crimson throat and fore-neck. *Cephalopterus ornatus*, the Umbrella-bird, is entirely black, with a huge expanded umbrella-like crest of bare-shafted incurved feathers, and a long

FIG. 103.—Umbrella-bird. *Cephalopterus ornatus*. $\times \frac{1}{5}$.

flattened and feathered gular wattle; *C. penduliger* has this appendage extraordinarily long and cylindrical; *C. glabricollis* a bare orange throat with a terminal tuft on the red outgrowth. *Chasmorhynchus niveus* is white, with a spiral erectile process on the forehead, thinly covered with white feathers: *C. nudicollis* has the cheeks and throat naked and bristly, but lacks the excrescence; *C. variegatus* is white, with a brown head, black wings, and bare papillose throat; *C. tricaruneulatus* is chestnut, with a white head bearing three caruncles, on the forehead and at the gape. In this genus the females are green above and chiefly yellow below. The bill may be orange or red in the Family, while *Gymnoderus* alone has large white powder-down patches on the flanks.

The habits of these woodland birds are comparatively little known, but most of them frequent high trees, though some prefer low bushes; such forms as *Lipaugus* and *Heteropelma* haunt dense forests, *Pipreola* and *Phibalura* more open situations, while small flocks often occur at considerable elevations, *Heliochera* reaching ten thousand feet. *Cephalopterus ornatus* loves islands in rivers, *Chasmorhynchus* and *Xenopsaris* marshy glades or even sedge-growth. The flight, usually of short duration, is heavy and noisy in *Pipreola* and elsewhere, Swallow-like in *Phibalura;* insects are often captured on the wing, and not only these but spiders, molluscs, and even lizards, are occasionally sought upon the ground. Berries, seeds, and the like, however, constitute

FIG. 104.—Bell-bird. *Chasmorhynchus niveus.* $\times \frac{2}{7}$. (From *Waterton's Wanderings.*)

the chief food. *Cephalopterus* and *Hadrostomus*, at least occasionally, beat their prey upon a branch before swallowing it. The members of this Family are usually somewhat shy and dull, but the males of *Rupicola* were observed by Schomburgk to dance in turn with outspread wings before an assembled flock, strutting and parading with frequent leaps. This bird is credited with a voice like a monkey; *Chasmorhynchus niveus* is termed Campanero or Bell-bird from its clear, bell-like note, uttered with the caruncle erected, while its congeners have also ringing cries; *Cephalopterus* gives vent to long deep "lowings" at sunrise and sunset. *Tityra semifasciata* utters frog-like sounds, *Pachyrhamphus* a loud whistle, and other species notes resembling those of Tanagers, Tyrants, or Wrens. *Rupicola* fastens a nest of mud, surmounted by twigs and lined with moss, to projections of rocks

in damp, sunless caves, laying two buff eggs with reddish-brown and lilac spots; *Pyroderus orenocensis* deposits similar eggs on platforms of sticks placed in tree-forks; *Tityra semifasciata* lines holes in decayed limbs with dry grass to receive its white eggs; *Hadrostomus niger*, *H. homochrous*, and some species of *Pachyrhamphus*, hang big nests of such materials as leaves, plant-stalks and wool, with side entrances, from low branches; the two to four eggs, where known, being chocolate, faintly marked or unspotted; *Phibalura* fixes a cup of lichens in the crotch of a large tree, laying twice annually two greenish-blue eggs with neutral markings; *Cephalopterus* is said to make a rough nest of sticks; and *Pipreola riefferi* to deposit pale salmon-coloured eggs, sparingly spotted with reddish-brown.

Fam. VIII. **Phytotomidae.**—The Plant-cutters constitute a single genus *Phytotoma*, of four Finch-like species, having strongly serrated bills and pycnaspidean (p. 479) metatarsi. The primaries number ten, the secondaries nine, the rectrices twelve. *P. rara* of Chili is brown and black, with red crown and lower surface, white margins to the wing-coverts, and red-banded lateral tail-feathers; the female has yellowish-brown under parts streaked with black, and a brown crown. *P. raimondii* of North-West Peru is somewhat like, but has only a narrow red frontlet; *P. angustirostris* of Bolivia is greyer, with white on the secondaries and tail, and a browner breast; the hen being chiefly greyish, with black striations above and spots below; *P. rutila* of Argentina and North Patagonia is very similar. Flocks or pairs of Plant-eaters are found in dry open situations, the former often consisting solely of the comparatively unsuspicious males; they sit aloft on bushes, but hide when alarmed. The flight is whirring with sudden short undulations; the food consists of seeds and other fruits, tender shoots, buds and leaves; while the voice is decidedly harsh, the alarm-note of the male resembles the bleating of a kid, and the female's cry is cricket-like. The slight, shallow nest of twigs and fibres is placed in thick bushes, and contains four bluish-green eggs, flecked with brown. The birds are said to cut plants off close to the ground without apparent object.

The four Families that follow are often classed as *Tracheophonae*, and have loud voices owing to their tracheal syrinx (p. 22).

Fam. IX. **Dendrocolaptidae.**—This group, with over 200 species, occupies the Neotropical Region, excluding the Antilles,

and is divided by Mr. Sclater[1] into the Sub-families *Furnariinae, Synallaxinae, Philydorinae, Sclerurinae,* and *Dendrocolaptinae.*

The extremely variable bill is short and straight in *Geobates* and *Henicornis,* Warbler-like in the Synallaxinae, stouter and Shrike-like in the Philydorinae, extremely strong in *Hylexetastes,* short and incurved in *Xenerpestes* and *Phacellodomus,* short with upturned genys in *Glyphorhynchus, Xenops,* and *Pygarrhicus,* very long, thin, and decurved in *Xiphorhynchus,* very long, but only slightly curved in *Nasica,* and so forth. It is much hooked in *Ancistrops.* The endaspidean[2] metatarsus may be long and slender, as in *Sylviorthorhynchus;* stronger, as in the terrestrial Furnariinae and Sclerurinae; or shorter, as in the scansorial Dendrocolaptinae, which usually have large toes and sharp claws. The scales are almost obsolete in *Furnarius* and *Lochmias;* the outer and middle toes are partially connected in the Sclerurinae and Dendrocolaptinae. The wings, which have ten primaries and about nine secondaries, are long in *Pseudocolaptes,* moderate in *Xenerpestes,* short and rounded in *Lochmias,* and frequently decidedly abbreviated. The variable tail, normally of twelve rectrices, is often graduated; the shafts of the quills are stiffened and spiny in the Sclerurinae and Dendrocolaptinae, the latter of which climb and feed in Woodpecker fashion; in the Synallaxinae it is generally long, with pointed but comparatively soft feathers; in the Philydorinae it is short, *Anumbius* having particularly sharp rhachides. It is also short, though rounded, in *Xenerpestes, Coryphistera,* and *Limnophyes,* similar but longer in *Clibanornis,* while it has the shafts projecting beyond the vanes in *Homorus, Oxyurus,* and *Sittosomus. Schizoeaca* and *Synallaxis* have only ten rectrices, and *Sylviorthorhynchus* apparently possesses but six, the outer being very short and the inner excessively long with narrow decomposed webs. *Limnornis,* at least, has the tongue bristly towards the end.

The coloration is chiefly brown of various shades, often with the tail chestnut—or, rarely, the body, as in *Homorus;* spots, striations, or cross-bars, of white, fulvous, or black occur frequently, and *Margarornis* has pearl-like markings below. The rump or under parts may be white, and the throat occasionally exhibits a black, rufous or yellow patch, or the breast a chestnut band; while black, rusty, brown, or grey caps are not uncommon, that of

[1] *Cat. Birds Brit. Mus.* xv. 1890, p. 3. [2] *I.c.* interiorly scutellated at the back.

Siptornis albiceps being white. The bill may be red, or exceptionally the feet white, as in *Furnarius leucopus*. Crests are found in *F. cristatus*, *Synallaxis semicinerea*, *Coryphistera*, and *Homorus*. The sexes, as far as known, are similar. The large *Drymornis bridgesi* is over a foot long, but many forms are not half that size, and most are comparatively small.

The habits are extremely diverse. *Geositta cunicularia* flits along low and swiftly, like a Wheatear, with the tail in motion, or crouches and runs before the pedestrian, uttering a note resembling "piti-piti," varied by a ringing trill. It frequents bare

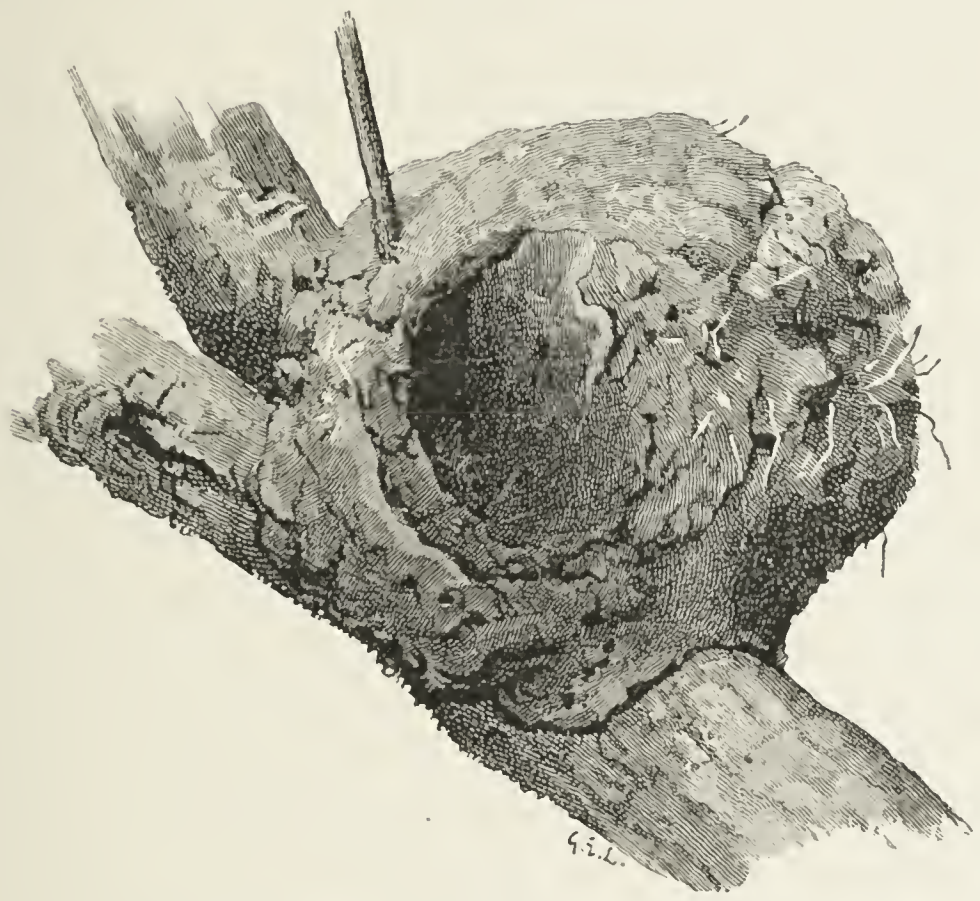

FIG. 105.—Nest of Oven-bird (*Furnarius*). $\times \frac{1}{5}$.

spots, and bores oblique tunnels in biscacha burrows, sandy banks, or mud walls, ending in cavities lined with soft grasses, where it lays five white eggs. The food consists of seeds, insects, and their larvae, the bill being commonly used to dig. *Lochmias nematura* fills a similar hole with a large-domed nest of twigs and roots, lined with leaves, which contains two white eggs. The Oven-birds (*Furnarius*) run or hop unconcernedly among the wayfarers with the head thrown back, or pause with one foot uplifted; they utter incessant and loud, but not unmelodious, cries with the beak outstretched, which are even heard at night.[1] Worms,

[1] Ducts are said to be sung; cf. Hudson *Argentine Ornithology*, i. 1888, p. 168.

insects and their larvae are sought upon the ground, and both sexes incubate, the pairs keeping together throughout the year. The curious nest (Fig. 105) is placed in exposed situations on branches, in forks of trees or shrubs, on posts, rocks, or house-roofs; it has thick walls, almost unbreakable when dry, of clayey mud and dung mixed with a little hair or dry grass, a lining of the same materials underlying the three to five white eggs. This massive structure has an inner chamber with an outer passage running partly round it, and is generally the work of several months, the materials being only procurable in damp weather. The above refers at least to *Furnarius cinnamomeus*, *F. minor*, and *F. rufus* (the "Hornero" or Baker); but White[1] states that *F. figulus* builds a stick nest, and E. Bartlett[2] that *F. torridus* deposits four creamy white eggs on twigs and bents in holes in banks. *Upucerthia*, resembling *Geositta* in general habits, ranges to an altitude of nine thousand feet. The lively *Cinclodes* recalls both the Wheatear and the Dipper, as it runs with upturned tail from stone to stone, takes short, low flights, or hunts for crustaceans, molluscs, and insects in the water, equally happy on the streams of the Andes, or the desolate lake-sides of Patagonia. The note is a sharp trill, while three white eggs are laid on a bed of grass and fur in holes. *Sclerurus* frequents damp forests, scratching among the leaves, and crouching, when startled, on some trunk. *Phloeocryptes* flies weakly, but hops actively about reed-beds in pursuit of flies, uttering reiterated grating notes; it attaches its Wren-like nest of grass or rushes and mud, lined with feathers, moss and hair, to a few of the reed-stems, and builds a projection over the entrance. The two or three oval eggs are glossy blue. The shrill-voiced *Leptasthenura* clings to the branches in search of insects like a Tit, and lays from three to six pointed white eggs on soft materials in holes in trees, sometimes utilizing nests of *Furnarius rufus*, *Siptornis sordida*, and other species. *Synallaxis*, usually seen in pairs searching for food upon the bushes, has a persistent harsh double call or a cat-like cry; it forms a loose, oval structure, which would fill an ordinary wheel-barrow, of thorny sticks and twigs in forks of trees, lining it with hair, feathers, woolly leaves, and the like, and often capping it with more leaves. This generally possesses a lower chamber connected by a vertical or horizontal passage with the entrance, itself protected by a tubular fabric; while more than

[1] *P.Z.S.* 1882, p. 609.

[2] *Op. cit.* 1873, p. 268.

one nest is often found in the same tree. The three or four eggs are pale greenish-blue or whitish. *Siptornis sordida* appears to have similar habits, but several of its congeners run like mice; or conceal themselves in herbage or holes, the marsh-loving species uttering very whirring notes. *S. sulphurifera* fabricates a domed nest of grass among rushes, and lays two white eggs; that of *S. maluroïdes* is open, and lined with feathers and wool, though the site is similar; that of *S. striaticeps* resembles the last-mentioned, but is placed in a tree-fork and contains four or five white eggs. *S. hudsoni* arches the grass over a hollow in the ground in open spots, and deposits five pale buff eggs on a little powdered dung; its flight is Pipit-like, and its cry melancholy. *Phacellodomus*, usually found in hot dry valleys, is sluggish, and has a shrill, harsh voice; the nest, containing four white eggs, being hung from the end of a branch, and recalling that of *Synallaxis*. *Xenops, Sittosomus, Picolaptes, Xiphorhynchus, Pseudocolaptes*, and many other forms are denizens of damp forests, and run up the tree-trunks spirally like Creepers, searching for prey and tapping the bark as Woodpeckers do; the cries are plaintive or noisy, and the white eggs, apparently two in number, are laid in holes. Large insects are sometimes battered upon the branches. *Anumbius acuticaudus*, the "Thornbird" or "Firewood Gatherer," makes a bulky nest some two feet high of thorny sticks, and places it in isolated trees. From an entrance near the top a spiral or zigzag passage leads to a lower cavity lined with grass, hair, feathers, and wool, where five pointed white eggs are deposited; while sometimes an upper roosting chamber is added. This bird utters ticking chirps or trills, and feeds mainly upon the ground, regaining the branches with difficulty. *Homorus lophotes*, the "Cachalote," with its strikingly white eyes and blue beak, haunts plains with scattered trees or bushes, being decidedly shy and quick of foot, though weak of flight; it eats insects, and turns up the earth with its bill or claws. Rasping cries are often emitted in concert; while the nest—even larger than that of *Anumbius*—is a loose mass of similar structure, placed on some low branch or in a bush, the three or four white eggs occasionally shewing through the bottom. *Drymornis*, again, has Woodpecker-like habits, whereas *Limnornis* and *Limnophyes* creep about dense reed-beds, and only appear now and then to utter jarring or chattering sounds.

Fam. X. **Formicariidae.**—The so-called "Ant-birds"—not known to live on ants—are plentiful in the forests of northern South America, whence the numbers decrease to Central America, Chili and Argentina. Of the two hundred or more species none inhabit the Antilles, but three occur in Trinidad and one in Tobago. Mr. Sclater[1] allows as provisional Sub-families the strong *Thamnophilinae*, the weaker *Formicariinae*, and the long-legged *Grallariinae*.

The beak is strong, compressed, hooked, and terminally toothed in the Thamnophilinae, being exaggerated in *Batara*, large and swollen in *Cymbilanius*, and exceptionally hooked in the former genus and *Pygoptila*; *Cymbilanius*, *Neoctantes*, and *Clytoctantes* have the genys upturned. In the Formicariinae the bill is weaker and but slightly hooked, being very long and thin in *Rhamphocaenus*; in the Grallariinae it is usually elevated and compressed, though broad in *Pittasoma*. The taxaspidean metatarsus (p. 471) is moderate or short in the Thamnophilinae, and remarkably long in the Grallariinae, where it may be very strong, as in *Pittasoma*; among the Formicariinae it is short and thick in *Rhopoterpe* and *Formicivora*, long and thin in *Psilorhamphus* and *Formicarius*, and so forth. In *Phlogopsis*, *Psilorhamphus*, *Rhamphocaenus*, *Heterocnemis*, *Myrmeciza*, *Hypocnemis*, *Pithys*, and *Gymnopithys* the scutes are nearly fused. The outer and middle toes are joined towards the base. The wings, which have ten primaries and nine secondaries, are normally short and rounded, though longer in *Rhopoterpe*; the tail is commonly long and broad in the Thamnophilinae, varies greatly in the Formicariinae, and is very short and square in the Grallariinae. It may be rounded or graduated in the first two Sub-families, and *Terenura* has it remarkably thin; *Cercomacra*, *Formicivora caudata*, and *F. ferruginea* have only ten rectrices in place of the usual twelve. *Thamnomanes* has well-developed rictal bristles, *Rhamphocaenus* has the nostrils in a groove and partly covered by a membrane.

The sexes are similar, and mainly reddish-brown, in *Rhamphocaenus*, *Phlogopsis*, and the Grallariinae; but generally the males are black and white, black, grey and brown, or uniform black; and the females ferruginous, more or less relieved by black and white. Cross-bars, spots, and striations are not uncommon, the white often shewing as a band on the tail, an edging to the wing-coverts, or exceptionally, as in *Pygoptila margaritata*, as

[1] *Cat. Birds Brit. Mus.* xv. 1890, p. 177.

round spots on both wing and tail; while the yellowish lower parts of *Myrmotherula pygmaea*, *Herpsilochmus rufimarginatus* and three species of *Terenura* exhibit the brightest tints found in the Family. Black or dark-hued caps are not infrequent; crests occur in *Batara*, *Pithys*, and many members of *Thamnophilus*; the rump-feathers are often dense and elongated, as in *Thamnistes*, *Pygoptila*, *Chamaeza*, *Cercomacra*, and *Thamnomanes*; those of the flanks are much developed in *Thamnocharis*; those of the lores are short and erect in *Pyriglena*. Bare red or bluish orbits are found occasionally; *Gymnocichla* has most of the head naked and blue; and the irides may be red, white, or brown. *Batara* is quite fourteen inches long, *Myrmotherula pygmaea* about three.

The usually shy and retiring Formicariidae either skulk among dense undergrowth in hot tropical forests, or frequent more cultivated districts; they creep about silently, singly or in pairs, seeking spiders, insects and their larvae, on the twigs and foliage of trees, or on parasitical plants or grasses; while they habitually keep near the ground, though sometimes joining flocks of other birds in their higher flights. Many carefully search the lower surface of the leaves for food with the head downwards, and occasionally eat seeds. The Grallariinae appear to be entirely, and the Formicariinae to a great extent terrestrial, hops being the characteristic mode of progress; the tail is commonly carried erect or in motion, as in the case of *Formicarius*, and is often much abraded by the thorny thickets. *Thamnophilus albinuchalis* and some other species choose dry situations, but generally the vicinity of water is preferred. The ordinary note in the Family is deep and powerful, and is said to have the effect of ventriloquism; it consists of monotonously repeated sounds, like ke-ke-ke or ko-ko-ko, varied by more rasping tones or trills. The nest, a slight shallow structure, generally hung from the lower twigs of a tree or bush, is composed of straws, fibres, roots, and hair, or occasionally of leaves, moss, and wool; it contains two or three white, bluish, or rufous-brown eggs, usually spotted, streaked, or zigzagged with red-brown, but more rarely with grey.

Fam. XI. **Conopophagidae.**—These curious birds, and their equally remarkable allies the *Pteroptochidae*, differ from all other Passeres in having two incisions posteriorly on each side of the sternum. The *Conopophagidae*, extending from Colombia to Bolivia and Brazil, include the genus *Conopophaga* and probably *Coryth-*

opis. The head is large, the bill depressed in the first-named, longer and more compressed in the last; the exaspidean metatarsus (p. 473) is thick and long in the one, with broad curved hind-claw, but is thinner, with straighter and weaker hallux, in the other. The outer and middle toes are basally connected. The wings are moderate and rounded, as in the next Family; the tail is very short in *Conopophaga,* which has long, lax rump-feathers. The general coloration is brown, with a white mark behind the eye in the last-named genus; the head may be black, or chestnut with black sides; the throat black; the breast banded with chestnut, black or grey; or the central abdomen white. *Corythopis* has black striations below.

Fam. XII. **Pteroptochidae.**—This group ranges from Costa Rica to Patagonia, occurring up to an altitude of nine or ten thousand feet. The bill is comparatively long and thin in *Scytalopus* and *Merulaxis,* stronger in *Liosceles, Pteroptochus, Hylactes,* and *Rhinocrypta,* being much arched in the last-named; the culmen expands into a peculiar oval plate in *Acropternis* and *Triptorhinus;* while a membrane partially covers the nostrils. The taxaspidean metatarsus (p. 471) is generally elongated and strong, with long claws, the hallux being long and incurved in *Hylactes,* and similar but straighter in *Acroptcrnis;* the whole foot is shorter in *Rhinocrypta,* more slender in *Pteroptochus,* while the scutes are fused in front in *Liosceles.* The short, rounded wings have ten primaries and eight secondaries; the tail varies in length, and may be graduated, as in *Merulaxis* and *Acroptcrnis,* or short and more even, as in *Triptorhinus. Hylactes* has fourteen rectrices in place of twelve. The colour is blackish, dark grey, or brown, often barred or scalloped with black; the crown, rump, breast, or belly are at times chestnut or rufous, the lower parts varied with white, or even banded with orange. *Merulaxis* has long, stiff loral plumes, *Rhinocrypta lanceolata* a crest, and several forms elongated rump-feathers. In *Acroptcrnis* the back and abdomen are ocellated with white. The sexes are nearly similar.

These peculiar birds are commonly shy and retiring, hopping actively about with erect tails, or running like mice, but rarely flying, except between the boughs and the ground. They are decidedly difficult of observation, though they follow up the pedestrian under cover, betraying their position by their scolding cries. Many species, such as *Hylactes tarnii,* the "Guid-guid," *Pteroptochus rubecula,* the "Cheu-can," and *Triptorhinus paradoxus,* the "Cheu-

gui," inhabit damp, gloomy forests; others often frequent dry plains, or stony and bushy hill-sides, as *H. megapodius*, "El Turco," and *P. albicollis*, the "Tapaculo"; while *Scytalopus magellanicus* prefers thick woods, but also haunts grass-lands in the Falkland Islands. *Rhinocrypta lanceolata*, the "Gallito," or Little Cock, lives in thickets and hedges, and struts in the open like a Fowl. The food, chiefly obtained upon the ground, consists of insects, seeds, and buds. The noisy and generally harsh notes vary considerably, *Hylactes tarnii* yelping like a dog, *Pteroptochus albicollis* sometimes uttering a sound like a coo, *Triptorhinus paradoxus* a reiterated frog-like croak, *Rhinocrypta lanceolata* a hollow chirrup or a scolding cry. The nest, commonly situated near the ground, is said in some cases to be made of sticks; *Rhinocrypta* forms a domed structure of grass in a bush, and lays four eggs; *Scytalopus magellanicus* is recorded as using a mass of moss upon a bank to contain its set of two; *Hylactes* and *Pteroptochus* are reported to nest in burrows. The eggs are white, at least in the first three.

2. Passeres diacromyodae.

C. *Suboscines.*

This group contains only the two Families *Menuridae* (Lyre-birds) and *Atrichornithidae* (Scrub-birds), each with one genus, *Menura* and *Atrichornis* respectively. The former possesses three pairs of vocal muscles, the latter only two pairs;[1] *Menura*, moreover, has a peculiarly long sternum, constricted towards the middle, while *Atrichornis* has but rudimentary clavicles, being thus unique among the Passerine forms.

Fam. I. **Menuridae.**—Lyre-birds have a stout bill; very long and powerful metatarsi, with robust elongated straight claws; and somewhat short rounded wings, with eleven primaries and ten secondaries. The tail has sixteen rectrices, and in the males of two species has the exterior pair of feathers curved like a lyre, with very narrow outer and very broad inner webs; the next six pairs have very distant barbs and no barbules, except towards the base; while the two median plumes have narrow inner and no outer webs, and after crossing below, curve boldly outwards. The tongue is sagittate, the furcula U-shaped, the after-shaft rudimentary; the adults have no down. *M. superba* of New South Wales and South Queensland, some thirty-three inches long, is

[1] Some *Oscines* have as many as seven pairs, but *Sphenocacus* has only three.

dull brown, with a slaty tinge above, and more rufous throat, wings, and tail-coverts; while the outer rectrices exhibit regular notch-like transparent or blackish markings on the chestnut inner webs, caused by the absence of barbules. The naked orbits are

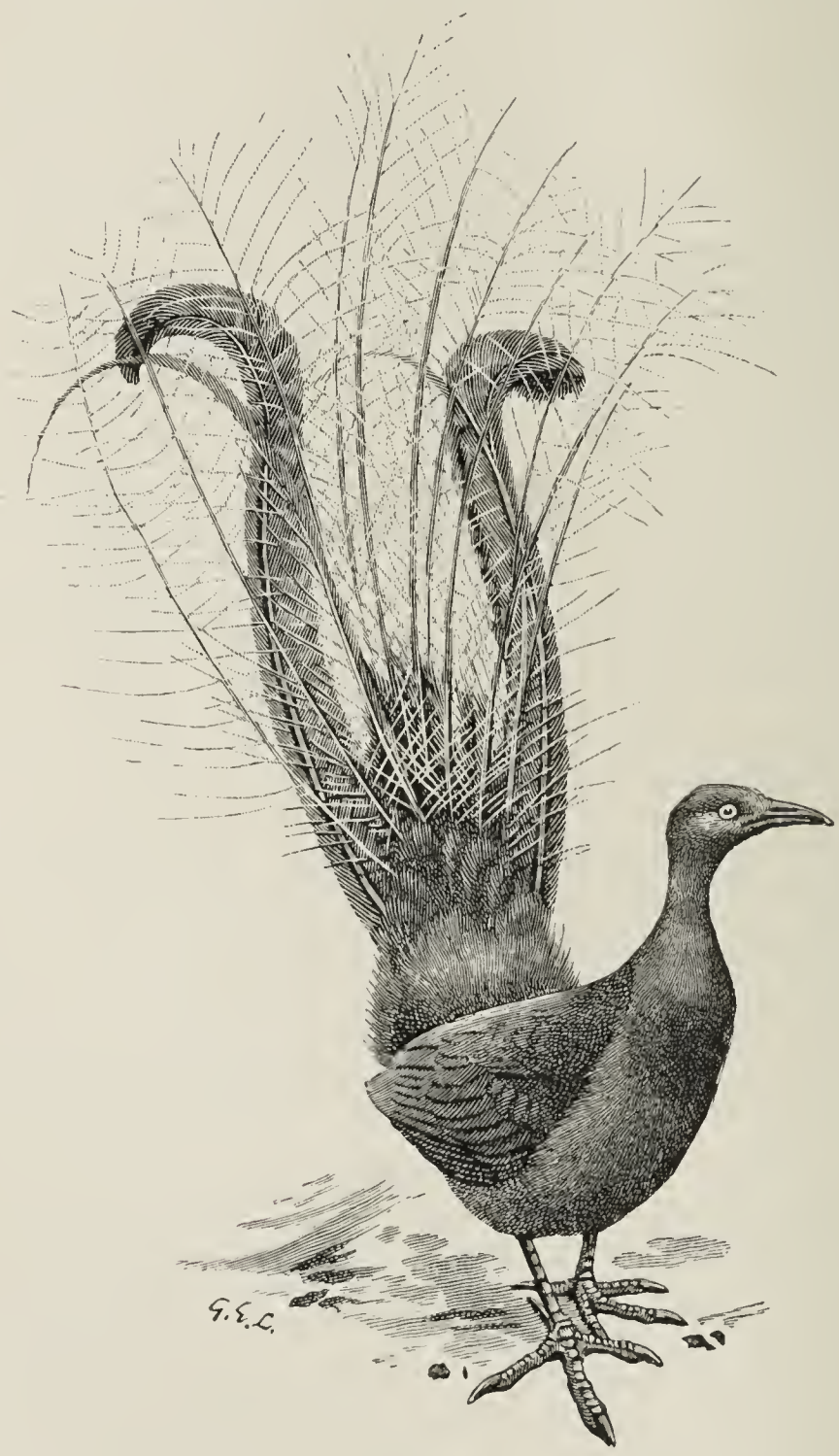

FIG. 106.—Lyre-Bird. *Menura superba*. $\times \frac{1}{10}$.

bluish or lead-coloured. The female has a long, broad, normal tail, the median feathers exceeding the rest. *M. victoriae*, of Victoria, is darker, with more boldly marked outer rectrices. *M. alberti*, of Queensland, and the Richmond and Clarence River districts of New South Wales, is redder above, and has the tail less lyrate, the outer feathers being shorter, with no transparent notches.

Lyre-birds haunt precipitous sandy gullies in thick forests with tangled undergrowth, whether inland or near the coast; and, though able to fly, live chiefly upon the ground, whence they leap, when scared, to branches even ten feet high. They run with the tail horizontal, and scratch among fallen leaves for insects —especially coleoptera—myriapods, worms, and molluscs; the solitary individuals or pairs which are usually observed being particularly shy. Each cock has a walk or playground, and scrapes little hillocks or hollows for dancing places, where he struts or pirouettes with erect tail and drooping wings, scratching, pecking, and singing at intervals. Apparently, however, he is not polygamous. The normal cry is a loud, liquid, gurgling sound; but the "Pheasants," as the Colonists term them, are clever mockers, imitating a cock's crow, a hen's cackle, a dog's bark or howl, the Laughing Jackass's note, or even the setting of a saw. The tail-feathers are said to be shed after breeding, and to be fully developed only by the fourth year, when males begin to sing. The oval, domed nests, placed on ledges of cliffs, on tops of old stumps, in forks of trees, or by fallen logs, are loose bulky masses of sticks, bark, grass, leaves, ferns, and moss, lined with roots and the bird's feathers. The one large egg has a stone-grey, brown, or dark purple ground-colour, blotched, dotted, and streaked with purplish or blackish-brown. The chicks are said to be covered with black down in *M. victoriae*, white in *M. alberti*, and brownish in *M. superba*; and to remain six weeks in the nest. The hen sits with her tail curled sideways or forwards. The flesh is dark, tough, and unpalatable.

Fam. II. **Atrichornithidae.**—*Atrichornis* has a large bill; moderate scutellated metatarsi; extremely short wings with eleven primaries, the outer of which is very small, and some eight secondaries; and a long, broad, graduated tail with twelve rectrices. The tongue is sagittate, the aftershaft rudimentary, and no down is present on adults. *A. clamosa* of Western Australia, about eight and a half inches in length, is brown above, barred with dusky, and reddish-white below, with a black pectoral patch; *A. rufescens* of New South Wales has the lower parts like the upper. The females appear to be unknown. These very shy birds haunt dense scrub, or grassy and bushy tracts, being very difficult of observation; they mimic the notes of other species cleverly, and also utter a peculiar noisy cry. They scratch in the ground, probably for insect-food.

D. *Oseines.*

Of this group, or the true singing birds, the anatomy is even less worked out than that of the *Suboscines*, and consequently the relationships are in many cases extremely doubtful. The *Hirundinidae* stand distinctly apart, with no other Families near them, though some similarity of habits, and possibly of structure, may be recognised in certain *Muscicapidae* (especially if *Artamus* be included among them), and to a less extent in a few *Sturnidae;* yet almost as much resemblance may be perceived in some *Tyrannidae*, which (not being Oscinine) can have no affinity to the *Hirundinidae*. The likeness is therefore probably one of analogy only, and, if so, of no taxonomic value. Here again it must be stated that the *Oscines* hardly attain more than the rank of a Family, and that in the Passeriformes the "Families" have not the same value as in the foregoing Orders.

The *Alaudidae* are generally recognisable by the casing of their metatarsi (p. 496), but in other respects they seem to shew an affinity to the *Motacillidae* (*Anthinae*) on the one hand, and to the *Fringillidae* on the other. The wing-characters, on which reliance was formerly placed, prove to be wholly untrustworthy.

As to the rest of the "Families" of *Oscines*, it is impossible to indicate their probable relations by placing them in sequence, or even at present to group more than a few of them with any degree of assurance. Some have not yet been defined at all, and few of them sufficiently for anyone to be confident as to their limits. Thus in the *Muscicapidae* hardly any two systematic ornithologists will agree as to which genera should be included and which excluded. If restricted to Old World forms, there is still no defined boundary between them and the *Campephagidae*, while there is perhaps even less distinction between them and the *Sylviidae* (or *Sylviinae*, if these last be included among the *Turdidae*). Moreover, by some taxonomers the *Mniotiltidae* have been referred to the *Muscicapidae*, and though there is an obvious distinction between them in the number of the primaries, the instance of the *Alaudidae* (already mentioned) shews that this may be of very slight importance.

Some other "Families" may perhaps be grouped with less risk of error. The *Troglodytidae, Certhiidae, Sittidae* and *Paridae* are possibly such; but the limits of the last-named are

certainly not laid down, and it would be hard to give a good reason either for admitting or refusing to admit into it genera like *Liothrix* or *Chamaea*, while the puzzle is still greater in regard to some forms from Australia and New Zealand.

The two latest writers on the subject, Dr. Gadow and Professor Newton, abstain from offering any scheme of Classification of the *Oscines*, the latter limiting himself to the declaration, already expressed by the late W. K. Parker, that the Corvidae should stand as the highest group. As regards their predecessors it will be enough here to enumerate the "Families" in the order in which they were arranged by Dr. Stejneger[1] in 1885, and Dr. Sharpe[2] in 1891; the scheme of the last author, however, being reversed to harmonize with the plan of the present volume, in which the lower groups are assigned priority. The *order* of Dr. Stejneger, which is based on both anatomy and morphology, is that subsequently followed, but his Families are not invariably adhered to.

Dr. Stejneger.	Dr Sharpe.
Alaudidae.	*Hirundinidae.*
Motacillidae.	*Muscicapidae.*
[H]Enicuridae.	*Campophagidae.*
Timaliidae.	*Pycnonotidae*
Leiotrichidae.	*Timeliidae.*
Muscicapidae.	*Mimidae.*
Turdidae.	*Troglodytidae.*
Cinclidae.	*Cinclidae.*
Troglodytidae.	*Turdidae.*
Chamaeidae?	*Sylviidae.*
Mimidae?	*Vireonidae.*
Hirundinidae.	*Ampelidae.*
Campephagidae.	*Artamidae.*
Dicruridae.	*Laniidae.*
Ampelidae.	*Regulidae.*
Artamidae?	*Paridae.*
Laniidae.	*Zosteropidae.*
Vireonidae?	*Dicaeidae.*
Paridae.	*Nectariniidae.*
Oriolidae.	*Meliphagidae.*
Paradiseidae.	*Certhiidae.*
Corvidae.	*Mniotiltidae.*
Sturnidae.	*Motacillidae.*
	Alaudidae.
	Fringillidae.
	Coerebidae.

[1] Stejneger, *Standard Natural History*, iv. 1885.

[2] Sharpe, *A Review of Recent Attempts to Classify Birds*, 1891 (2nd Ornith. Congress).

Dr. Stejneger.	Dr. Sharpe.
Meliphagidae.	*Tanagridae.*
Nectariniidae.	*Ploceidae.*
Dicaeidae.	*Icteridae.*
Certhiidae.	*Oriolidae.*
Coerebidae.	*Dicruridae.*
Mniotiltidae.	*Eurycerotidae.*
Tanagridae.	*Eulabetidae.*
Ploceidae.	*Sturnidae.*
Icteridae.	*Ptilonorhynchidae.*
Fringillidae.	*Paradiseidae.*
	Corvidae.

As regards structure, the *Oscines* have one posterior incision or fenestra on each side of the sternum; the furcula is U-shaped; the tongue is variable, as is the syrinx (pp. 13, 21, 22, 467); the nostrils may be pervious or impervious; an after-shaft is nearly always present, though comparatively weak; down occurs sparingly on the blind young, and is absent, or only found on the unfeathered spaces, in adults. The primaries number ten or eleven; the secondaries nineteen, twenty, or even more; the rectrices normally twelve. The form of the bill, wings, and tail are discussed under the different Families; the metatarsus exceptionally is smooth in front, but is ordinarily scutellated, while behind it is smooth and generally compressed, except in the Alaudidae, which, having it scutellated posteriorly, are termed scutelliplantar, as opposed to laminiplantar (with one horny growth behind). The hallux is the strongest toe.

Of fossil forms of Oscines, Osteornis (*Protornis*) of the Lower Eocene of Glarus in Switzerland may be Passerine; *Palaegithalus* (Sylviinae) and *Laurillardia* (Sturnidae) have been found in the French Upper Eocene; *Palaeospiza* (Fringillidae) in the Oligocene of Colorado; *Motacilla, Turdus, Lanius, Corvus, Fringilla,* and *Loxia* in the French Miocene or in the Breccia of Italy; *Scolephagus* and *Corvus* in the Pliocene of Oregon; *Palaeocorax* in the Chatham Islands; an extinct *Foudia* (Fringillidae) in Réunion.

Fam. I. **Alaudidae.**—The Larks inhabit the Palaearctic, Indian, and Ethiopian Regions, only one genus (*Otocorys*), with many races, being found in America, and one (*Mirafra*) in the Australian Region. Of the former, *O. peregrina* occurs as far south as Bogota, while the latter is found in Australia and Flores. *M. hova* is peculiar to Madagascar, *M. javanica* to Borneo and Java, *Spizilauda deva* to India. *Alauda arvensis,* the Sky-Lark, and *Lullula arborea,* the Wood-Lark, alone breed in Britain: but *Otocorys alpestris,* the Shore-Lark, is a regular winter-visitor

to our shores; while *Galerita cristata*, the Crested Lark, *Calandrella brachydactyla*, the Short-toed Lark, and *Melanocorypha sibirica*, the White-winged Lark, occur occasionally. The Sky-Lark has been introduced into Long Island, N.Y., Australia, and New Zealand.

The bill is long and curved in *Certhilauda* and *Alaemon*, shorter and slender in *Alauda*, similar but more robust in *Galerita*, abbreviated and conical in *Calandrella*, *Pyrrhulauda*, and *Melanocorypha*, and extraordinarily stout in *Rhamphocorys*, with a gap between the maxilla and mandible. The metatarsus is elongated, and may be more slender as in *Certhilauda*, or stouter as in *Galerita* and *Melanocorypha*; the hind-claw is generally much lengthened and straight, but may be short and curved, as in *Calandrella*, *Pyrrhulauda*,

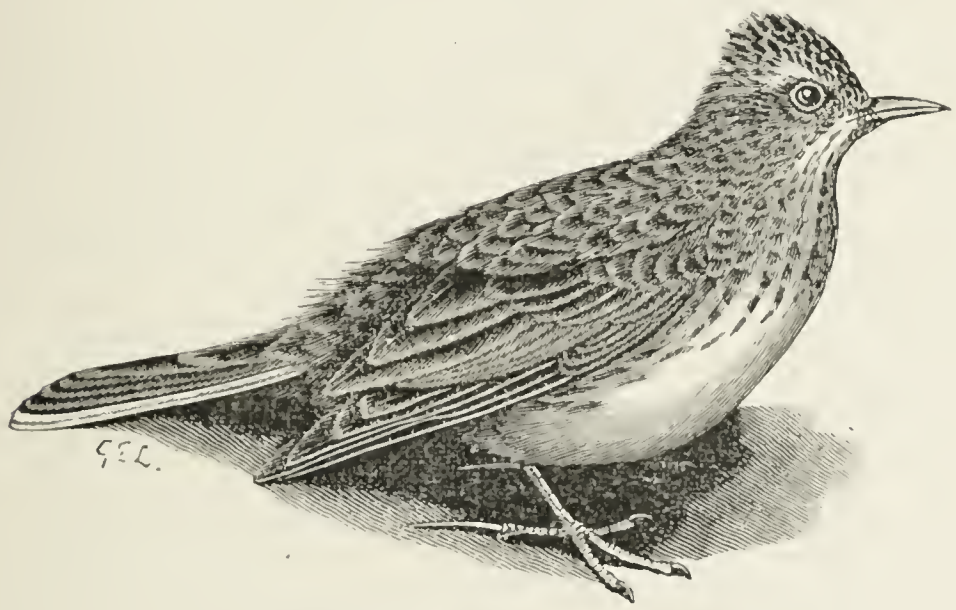

FIG. 107.—Sky-Lark. *Alauda arvensis*. × ½.

and *Alaemon*. The wing varies much in length, many forms having the outer primary almost aborted, though in *Mirafra* and elsewhere it is of fair size; the inner secondaries are nearly as long as the primaries in *Calandrella*. The tail is moderate or short, and may be rounded, nearly square, or emarginate. The normal coloration is light-brown with darker longitudinal streaks, the under parts being whitish and frequently spotted anteriorly; desert forms, however, often have uniform pale buff or rufous plumage—for example, *Galerita isabellina* and *Ammomanes*. *Melanocorypha yeltoniensis* is nearly black in the male; others of the same genus have a black gorget; the black-cheeked *Rhamphocorys*, *Alaemon alaudipes* and *Melanocorypha sibirica* exhibit white wing-patches; while *Otocorys* has a projecting black tuft on each side of the occiput, black cheeks, lores, and bands on the crown and breast, the

rest of the face and throat, or even the lower parts, being yellowish. *Tephrocorys cinerea* and *Mirafra apiata* have a rufous crown and breast respectively. *Pyrrhulauda* is chiefly black below, and varies above from grey to chestnut, relieved by black and white. Ordinarily the sexes in Larks are similar. Crests are not uncommon.

Certhilauda, Alaemon, and *Ammomanes* inhabit deserts or arid plains, *Alaudula raytal* frequents sandy islets, and *Otocorys* often selects uplands; but most forms only require open country, being chiefly ground-birds and seldom found near woods. *Lullula,* however, loves heaths and the outskirts of copses, and *Mirafra* bushy spots. Larks often flock together, and are not usually shy, since they will even enter villages; the desert species are particularly quick runners, while the flight is exceptionally weak in *Ammomanes, Calandrella,* and some others, though as a rule sufficiently strong. Perching is not an uncommon habit, *Lullula* and *Mirafra* habitually settle on trees or tall bushes, and several forms squat to avoid detection. In general dusting takes the place of washing. The food consists of insects and their larvae, seeds, worms, small molluscs, crustaceans, or even berries. Most Larks soar while uttering their pleasing trills, and plaintive calls are often heard; *Lullula* has a more flute-like song, *Pyrrhulauda* utters a shrill chirp. *Galerita cristata* and *Melanocorypha calandra* imitate other birds successfully when caged. The cup-shaped nest of bents, lined with finer grasses, fibres, or hair, is placed in herbage or in some depression in the soil—wool, cotton, rags, or even sticks being exceptionally added; but two or three species of *Mirafra* build a domed structure, occasionally placed on bare rocks or roofs of houses. The eggs are generally whitish, closely spotted or zoned with purplish-grey or brown; some specimens, however, are thickly freckled with yellowish or marked with reddish. The number varies from two in *Pyrrhulauda,* and about three in *Ammomanes,* to five, six, or even seven. Both sexes incubate in some cases, while two or more broods are often reared in the season. Thousands of Sky-Larks are netted annually for the table.

Fam. II. **Motacillidae.**—This group comprises the Sub-families *Motacillinae,* or Wagtails, and *Anthinae* or Pipits. The bill is thin and more or less elongated, with a slight notch, the culmen being decidedly curved in *Oreocorys.* The metatarsus is very long in Wagtails, variable but shorter in Pipits; it is usually slender, with the hind claw well developed and slightly

curved; though it is stout, with very long hallux, in *Macronyx*, *Xanthocorys*, and *Neocorys*. The wing is commonly elongated and pointed, with the inner secondaries reaching nearly to the end of the primaries, but it is shorter and more rounded in some species of *Anthus*. The tail is very long in Wagtails, but moderate in Pipits, being generally somewhat emarginate.

Wagtails range over the Old World, but are lacking in Australia and Polynesia; two species extend to the extreme

Fig. 108.—Yellow Wagtail. *Motacilla raii*. $\times \frac{3}{5}$. (From *Natural History of Selborne*.)

north-west of America, one is accidental in Greenland, and one is restricted to Madagascar. Pipits are almost cosmopolitan, though not found in Polynesia; only two forms, however, inhabit North America, while one is peculiar to New Zealand, and another to Australia; *Anthus bogotensis* is exclusively Andean, *A. antarcticus* occurs in South Georgia, *A. bertheloti* occupies Madeira and the Canaries.

Wagtails are generally black and white, grey and white, grey with yellow breast (or even head), greenish with yellow lower

parts and greyish or black heads, or almost entirely yellowish. Most Pipits are brown above, with dark streaks, and light edges to the feathers, and are buff, whitish, or rufous below, with triangular brown spots. The outer rectrices are usually more or less white, as are sometimes part of the others. *Limonidromus*, however, is an olive-brown Wagtail with two black crescentic marks below, *Anthus chloris* a Pipit with a yellow patch on the breast. *A. rosaceus* has yellow axillaries; *A. tenellus*, has the wings, tail, cheeks, and under surface chiefly yellow, with a black pectoral band. The curious genus *Macronyx*, to its mainly brown coloration adds orange, yellow, or pink lower parts with a black gorget, while it shews a marvellous resemblance in other respects to *Sturnella* (p. 580)—*M. croceu* to *S. magna*, *M. ameliae* to *S. defilippii*. The bill and feet are usually black in Wagtails; the former is brown, with paler mandible and yellowish gape in Pipits, where the feet are brown, yellowish, or reddish. The females are duller, and in the Motacillinae the young are usually browner.

Wagtails frequent streams and stagnant waters, as in the case of the Pied, White, and Grey Wagtails, *Motacilla lugubris*, *M. alba*, and *M. melanope*; or they haunt fields of corn and meadows, as in the Blue-headed and Yellow Wagtails, *M. flava* and *M. raii*. All the above breed in Britain, but the White and Blue-headed species rarely. The Grey and the Yellow Wagtails both have yellow breasts, but the former has a grey, the latter an olive, back.

Pipits prefer open places with rough herbage, as for instance the Meadow-Pipit, *Anthus pratensis*; rocky shores, as the Rock-Pipit, *A. obscurus*; or open parts of woods and banks, as the Tree-Pipit, *A. trivialis*. These nest commonly with us, while the Red-throated Pipit, *A. cervinus*, the Tawny Pipit, *A. campestris*, Richard's Pipit, *A. richardi*, and the Water-Pipit, *A. spipoletta*, visit us occasionally. Flocks are rarely seen, but a few individuals often congregate on the sea-beaches in winter; the flight is easy, though jerky, and not protracted; that of Wagtails being distinctly undulating. *Neocorys* soars like a Sky-Lark, and the Tree-Pipit in particular hovers above his perch while singing. The songs of the last-named, and of *Motacilla vidua* are more Finch-like; that of *Neocorys* Lark-like; those of other species shrill, and less frequent than their repeated call- or alarm-note of chit-chit (Pipits) or chis-sic (Wagtails). The food consists of seeds, insects, worms, small molluscs and crustaceans, usually procured upon the ground,

Wagtails hunting for flies round cattle, and being very commonly seen wading. Pipits make their nests almost entirely of grass, *Anthus correndera* and *A. rufulus* occasionally adding an over-arching cover; Wagtails use moss, grass, and roots, with a bedding of hair and feathers. The four to six eggs are bluish white or brownish, with grey, blackish, or brown spots in the Pied Wagtail and its similarly coloured allies, yellowish-white with yellowish and greenish-brown markings in others of the Sub-family: in Pipits they are commonly greyish or yellowish-white with brown and grey mottlings, sometimes covering the whole shell; while in the Tree-Pipit they vary from grey with dark brown spots and streaks to reddish-white, with rich brown, claret-colour, or bright red markings or close frecklings. A black line or two is a common feature throughout the Family. Wagtails choose for nesting sites ledges of rocks, crevices, holes in trees or walls, tops of pollarded willows, stony banks, or—in the Yellow Wagtail group—hollows in the soil among herbage. Pipits prefer the ground, or even spots shaded by trees, as in the Tree-Pipit.

Fam. III. **Henicuridae.**—The Fork-tails, a group of doubtful affinity, generally placed near the Motacillidae, extend from the Himalayas and the hills of South and West China to Burma and the Great Sunda Islands, one of the species—some dozen in number—reaching Samarcand westwards. They are black and white birds, with stout, straight, and usually elongated bills, long, strong metatarsi without scutellation, moderate rounded wings, extraordinarily long forked and graduated tails—except in *Henicurus scouleri*, where the shape is square and the feathers short—and well-developed rictal bristles. The outer pair of rectrices are white. *H. ruficapilla* has an orange-chestnut crown and hind neck, nearly the whole back being chestnut in the female; that sex of *H. velatus* has a brown head: two species have the upper parts spotted with white, and two the back slate-coloured. Several of them have crests. The bill is black, the feet whitish. These active unsuspicious birds haunt forest-streams or hill-torrents, and hunt for molluscs, insects and their larvae, near or in the water. They often wag the tail when perched on stones or branches. The large nest is formed of fibres, roots, and moss, and is placed on rocks or tree-stumps: the three or four eggs are greenish-white, with scattered brownish spots.

Fam. IV. **Timeliidae.**—In this Old World assemblage are in-

cluded by Dr. Sharpe[1] many genera rather referable to the Turdidae, Pycnonotidae, Troglodytidae, and Paradiseidae; but the Family may be taken to contain most of that author's *Crateropodes* and *Timeliae*,[2] the Tit-like *Liotriches*, and perhaps *Clitonyx*, *Chactobias*, and *Myiophoneus*. The whole question, however, is very doubtful, and no decision can yet be arrived at. The supposed diagnostic points are the rounded wings curved to fit the body, the lax, soft plumage, the comparatively large outer primary, the similarity of the unspotted females and young, and the Thrush-like bill. This bill, however, may be very strong and hooked, as in *Myiophoneus* and *Gampsorhynchus*; stout, deep, and wide, with festooned maxilla, as in *Paradoxornis*; similar but smaller, as in *Chleuasicus* and *Suthora*; short and blunt, as in several of the *Liotriches*; extremely elongated, slender and decurved, as in *Pomatorhinus*; or extraordinarily so, as in *Xiphorhamphus*. It is not infrequently notched. The metatarsi are typically strong or even clumsy, and vary considerably in length; in *Liothrix*, however, they are slender; while *Cholornis* has only two anterior toes (p. 10). The tail, often broad and much graduated, may be very long, as in *Sibia*, or no longer than the upper coverts, as in *Oligura*; the rectrices being obliquely truncated in *Siva*, curved outwardly in *Liothrix*, and frequently pointed or somewhat spiny. Elongated rictal bristles are not uncommon; several species have crests, that of *Grammatoptila* being exceptionally large; rigid shafts occur in the head- and mantle-feathers of *Acanthoptila*, on the forehead in *Dumetia*, *Timelia*, and *Chaetops*; hair-like plumes decorate the back of *Macronus*; the inner secondaries are much produced in *Cinclorhamphus*; the cheeks are bare in *Acthocichla*.

The sexes are commonly alike, the plain rufous coloration being often relieved by black, white, and grey; *Liothrix* and *Clitonyx*, however, shew tints of red or yellow; *Myiophoneus* of purple, blue, and black, and in some cases maroon; *Brachypteryx* of indigo. *Hyperergus* is partly olive-green, while *Trochalopterum chrysopterum* and *T. phoeniceum* exhibit respectively golden and crimson hues, not to mention other instances.

Many of the forms are found from the Indian Region to New Guinea, New Caledonia, and New Britain, one reaching Fiji and two New Zealand; others occur in the Ethiopian countries, whence a species of *Argya* extends to Morocco and Tripoli, and

[1] *Cat. Birds Brit. Mus.* vi. 1881. [2] *op. cit.* vii. 1883, pp. xii-xvi.

a second to Arabia and the Jordan. *Crossleyia, Bernieria, Mystacornis, Xanthomixis* and *Oxylabes* are peculiar to Madagascar.

Most members of the Family inhabit woods near water with thick undergrowth, or more rarely stony hills, scrubby gullies, and rocky torrents; *Cinclorhamphus* haunts grassy plains; *Cratcropus kirki* prefers reeds. The majority are decidedly terrestrial, skulking warily among the bushes and grass, either singly or in small companies, while some are inquisitive and active. The flight is low, short, undulating, and laboured; but the birds hop and climb well, bounding over the ground or clinging to the trees. The Japanese and Chinese "Hill-Robin" (*Liothrix lutea*) and its allies are more arboreal, as are *Paradoxornis, Suthora,* and so forth. *Orthonyx* is said to dance like a Lyre-bird (p. 493). Many species scratch up the soil or dead leaves in search of insects and their larvae, which, with seeds, constitute the chief food; fruit, however, or even small reptiles, crabs, worms, and molluscs are occasionally eaten. The tail is often carried erect; *Cinclosoma* rises with a whirring noise; *Cinclorhamphus* hovers in the air. Several members of the Family are comparatively silent, *Sittiparus* and *Alcippe* twitter, *Stachyridopsis* utters clear, bell-like tones, *Timelia* slowly repeated cries, *Myiophoneus* a fine whistle; but usually harsh chattering or screaming noises alternate with chuckles, croaks, clucks, or a laughing chorus. *Psophodes* is called the "Coach-whip bird," from its notes ending like the crack of a whip. The habits of *Clitonyx* are said to resemble those of the Meliphagidae. The nest is commonly a rough structure of leaves, moss, herbage, and the like, often lined with roots, which is placed in low trees, bushes, reeds, grass, holes in trees, or banks, by *Garrulax, Argya,* and *Turdinus;* in crevices of rocks, by *Chaetops;* or on crags near torrents, by *Myiophoneus.* It may consist of somewhat softer

FIG. 109.—"Babbling Thrush." *Timelia maculata.* × $\frac{5}{11}$.

materials, frequently bedded with fur, wool, or feathers, as in *Crateropus, Paradoxornis,* and *Trochalopterum*—several pairs of the last-named occasionally using the same tree; or it may be a domed mass of grass, leaves, bark, and moss, situated on or near the ground, as in *Timelia, Orthonyx, Pomatorhinus, Pellorneum,* and *Rhopocichla. Lioptila* and some of its nearest allies build a mossy cup, adorned with cobwebs, in high firs or other trees. The eggs of *Crateropus* and *Argya* are deep greenish-blue, glossy and spotless; those of *Garrulax* are similar, or pale blue or white; those of *Dryonastes* light blue; those of *Pomatorhinus, Stachyris, Orthonyx,* and *Xiphorhamphus* white; those of *Paradoxornis* whitish, with yellow-brown and purple markings. The ground-colour is frequently greenish-blue, olive, brown, salmon, creamy, or white, and shews scattered or dense spots, streaks, freckles, blotches, or even hieroglyphics, of reddish, purplish, chocolate, olive, grey, or occasionally black. The coloration, however, is by no means constant in each genus, while the number varies from two to five or six. The Australian Pomatorhini fashion large domed nests, after the manner of Magpies, of twigs lined with bark and feathers, and add a spout-like entrance, while several are commonly found at the ends of the branches of the same tree; their buff or purplish eggs, clouded with brown and purple, and streaked with black hair-lines, number from four to ten.

Fam. V. **Pycnonotidae.**—The Bulbuls, often included among the Timeliidae, have a fairly long bill, usually somewhat stout and curved, which is Finch-like in *Spizixus,* very long and thin in *Phyllostrephus,* and so forth. The maxilla is generally notched, being minutely serrated in *Andropadus,* and decidedly hooked in *Tricholestes, Aethorhynchus,* and *Trichophoropsis;* while strong or weak rictal bristles are ordinarily present. The abreviated metatarsi lack scales in several genera. The wings are normally short, rounded, and concave—though more pointed in *Hypsipetes* and *Irena* (if these really belong to the Family), *Hemixus, Alcurus,* and *Ixocincla* or even long in *Tylas*—the secondaries are much elongated in *Aethorhynchus.* The tail is sometimes square or graduated, but is commonly rounded, being rarely forked, as in *Hypsipetes;* in *Irena* and *Micropus* the coverts are much lengthened, while they nearly equal the rectrices in *I. crinigera.* Crests occur frequently, the constituent feathers in *Alcurus* being obtuse, in *Criniger* long and pointed, in *Otocompsa* somewhat recurved.

Most of the Family are characterized by long, fluffy rump-plumage and conspicuous nuchal or dorsal hairs, the latter reaching their highest development in *Tricholestes*. The feathers hide the nostrils in *Irena* and *Spizixus*; *Poliolophus* has a yellow circum-ocular wattle, and several species of *Pycnonotus* possess fleshy eyelids of black, red, or grey.

The usual coloration is olive-brown, olive-green, or olive-yellow, commonly with wholly or partially yellow, white, greyish, or even orange, rufous, and buff under parts; *Hypsipetes perniger* is entirely black, *Microptus melanoleucus* black with white wing-spots, and many species are mottled with yellowish or white. *Trachycomus* has a yellow cap of decomposed bristly feathers; while elsewhere the head or the throat is often more or less black, brown, chestnut, grey, and rarely yellow or white. The tail and rump may be rufous, yellow, or orange, occasionally barred with black; and white or yellow markings frequently adorn the wings. *Otocompsa* shews crimson or scarlet ear-tufts, and crimson or yellow under tail-coverts; certain species of *Pycnonotus* have the latter scarlet, orange, or yellow; *Rubigula* has loose, stiff, scarlet plumage on the throat, and an orange under surface. *Chloropsis* is green and yellow, relieved by orange, blue, purple and black, and exhibits a conspicuous blue, purple, or emerald shoulder-patch, except in *C. cyanopogon* and *C. flavipennis*; *Aegithina* and *Aethorhynchus* are green, black, and yellow; while *Irena* (the Fairy Blue-bird) is either brilliant turquoise, with black wings, tail, and under parts, or purple-blue, varied by cobalt above, with or without a black mantle and under surface. The bill and legs range from brown, black, or plumbeous, to coral red, orange, yellow, or whitish. The sexes are similar, except in *Aegithina*, *Aethorhynchus*, *Chloropsis*, and *Irena*.

From their headquarters in the Indian and Indo-Malay countries, the Pycnonotidae extend to China, Hainan, Formosa, and the Moluccas, *Hypsipetes* even reaching Japan; they also occupy the whole Ethiopian Region, with Madagascar and the neighbouring islands. To these latter *Ixocincla* and *Tylas* (p. 533) are peculiar; while *Pycnonotus*, *Criniger* and *Xenocichla* inhabit both of the above Regions, and the first is found from Morocco to the Cyclades, Rhodes, Cyprus, and Palestine.

Bulbuls are gregarious arboreal birds of feeble flight, rarely seen upon the ground, where they move with awkward shuffles or short hops. The majority are sociable, and frequent gardens,

orchards, forests, and low jungles; they feed chiefly upon fruits, including berries and seeds, but also upon insects, which *Aethorhynehus*, *Aegithina*, and *Chloropsis* in especial seek among the leaves and branches of the trees. The ordinary note is a mellow cheerful whistle, becoming a pretty song in such species as *Pyenonotus haemorrhous*, and *P. xanthopygus*, the Ceylon and Palestine "Nightingales"; chattering and chirping sounds are, however, often heard, while *Criniger*, *Phyllostrephus* and *Hypsipetes* habitually utter reiterated jarring or croaking cries, particularly when roosting in company. The flimsy, or occasionally bulky, nests of twigs, fibres, grass, moss, and cobwebs are placed in low trees, bushes, creepers, or bamboo-clumps; *Aegithina*, *Chloropsis*, and *Irena* generally laying two or three white or greenish eggs with brown streaks or spots, and the remaining forms from two to four, of a pinkish white or salmon colour, with markings of various reds and purples. The nest of *Iole* is suspended by the rim like that of an Oriole. The Perso-Arabic Bulbul of poets is probably *Daulias hafizi*, a true Nightingale.

Fam. VI. **Muscicapidae.**—The Old World Flycatchers are a group of somewhat vague definition, *Hemipus* appearing closely allied to the *Laniidae*, *Cryptolopha* to the *Sylviinae*, *Lioptilus* to the *Timeliidae*. Connexion with the *Turdinae* is implied by the more or less spotted plumage of the young, though the metatarsus is usually scutellated anteriorly. Typically the bill is broad and flat, with stiff rictal and prominent nasal bristles; it is extremely wide, with the culminal ridge strongly developed in *Machaerorhynehus*, *Myiagra*, *Bias*, and *Smithornis*; *Sisura* has it longer and more slender; *Chelidorhynx* short, with a pronounced hook; and the diminutive *Smicrornis* exceptionally small; while many species have it much less robust. The feet, usually weak, may be stronger, as in *Chloropeta*; the wings, ordinarily elongated and pointed, and especially so in *Hemichelidon*, are at times abbreviated and rounded, as in *Niltava*, whereas the secondaries in *Platystira* and *Newtonia* nearly equal the primaries, of which the outer is very short. The tail is also short in *Diaphorophyia*, but is usually moderate or long, and frequently much graduated, as in *Rhipidura* (Fantail), *Elminia*, and *Terpsiphone*, the males of the last having the two median feathers twice the length of the body. *Terpsiphone*, *Cyanomyias*, *Bias*, *Trochocereus*, and so forth, have fine crests, shorter in the female; while fleshy wattles, round or

above the eye, of scarlet, blue, or yellow, are found in *Terpsiphone, Zoöcephus, Diaphorophyia, Platystira,* and *Arses.* The bill is sometimes reddish or blue, and the inside of the mouth green or yellow, as in certain Birds of Paradise.

The males of our summer visitors, the Spotted and Pied Fly-catchers, *Muscicapa grisola* and *M. atricapilla,* are respectively brown with whitish under parts streaked with dusky, and black and white; the hen-bird being similar in the former case, but in the latter olive-brown, with the frontlet, wing-patches, and lower surface buff instead of white. *M.* (*Erythrosterna*) *parva,* which is brown with grey head, and has a reddish-orange fore-neck that becomes rufous in the female, occurs accidentally in Britain. *Platystira* is glossy bluish- or greenish-black above with white markings, and white beneath with a black pectoral band, the female having greyer upper parts, and sometimes a maroon chest; *Erythromyias* is black and white, with an orange-rufous breast or back; *Pseudogerygone* is olive-green, brown, or grey above—dark crimson in *P. rubra*—with an admixture of black, buff, rufous, yellow, or white, and has similar or yellow tints below; *Chasiempis* is brownish, relieved by black, white, and bay; *Culicicapa* is greenish-yellow with a bright yellow lower surface, the head being grey in one species. The hen-bird in these four genera, where known, resembles the male. That sex of *Niltava* is blackish or purplish, varied with rich cobalt, especially on the neck, the under parts being orange-rufous or purplish-grey; the female is chiefly olive, often with a blue or lilac neck-patch. *Malurus* commonly shews a fine mixture of blue, purple, and velvety-black, with a little brown and white; one of its members is chiefly brown, but has a blue tail, and a lilac crown with black centre; a second is vermilion, black and brown above, and black below; a third has crimson in the place of vermilion; a fourth is bluish-black and white. The hen-birds are mainly brown, often with a blue, or even a green, tail. *Piezorhynchus* has two metallic black species, while *P. chrysomelas* is orange-yellow and black; *Metabolus* is almost white, with black face and throat; and lastly, *Terpsiphone* (or *Tchitrea*), well known on Chinese and Japanese screens and fans, contains several long-tailed and finely crested white birds, with glossy greenish-black head and throat, and with black markings on the wings and tail in *T. paradisi,* the Paradise-Flycatcher. The female is rich bay above, with similar head, but grey cheeks and throat. In

other species the males are said to be maroon, cinnamon, chestnut, blue-grey, or glossy-black above. *T. mutata* of Madagascar may be dimorphic. Nuchal collars, elongated silky flank-feathers, and spots or stripes below, are not infrequent in the Family.

Flycatchers are common in the Ethiopian, Indian, and Australian Regions; and several species are Palaearctic, four or five reaching Europe. Most of them are migratory, the Spotted Flycatcher nesting northwards to Tromsö and Archangel, the Pied Flycatcher nearly as far. They love wooded districts, and *Gerygone* even gloomy forests; while they are usually silent and solitary, feeding on little but insects, which are habitually caught upon the wing with an audible snap of the bill, though also procured upon the boughs or by darting to the ground. The graceful, undulating, or zigzag flight, and the sudden dash into the air, followed by a quick return to the perch, are especially characteristic, as is a frequent quivering of the wings and tail; *Rhipidura motacilloïdes* is Wagtail-like in habits; while *Sisura inquieta*, the "Grinder" of Australia, runs along the river-sides, or hovers like a Kestrel, making a grinding sound in the air, whence it descends vertically to secure its prey. Other species of *Rhipidura* pick flies off cattle, and rise and fall perpendicularly in the air, opening the fan-shaped tail or tumbling completely over. *Malurus* runs quickly, or bounds along with rapid hops. Most Flycatchers are tame, but several are pugnacious; *Laniioturdus* is stated to be gregarious; *Parisoma* creeps about thick bushes;

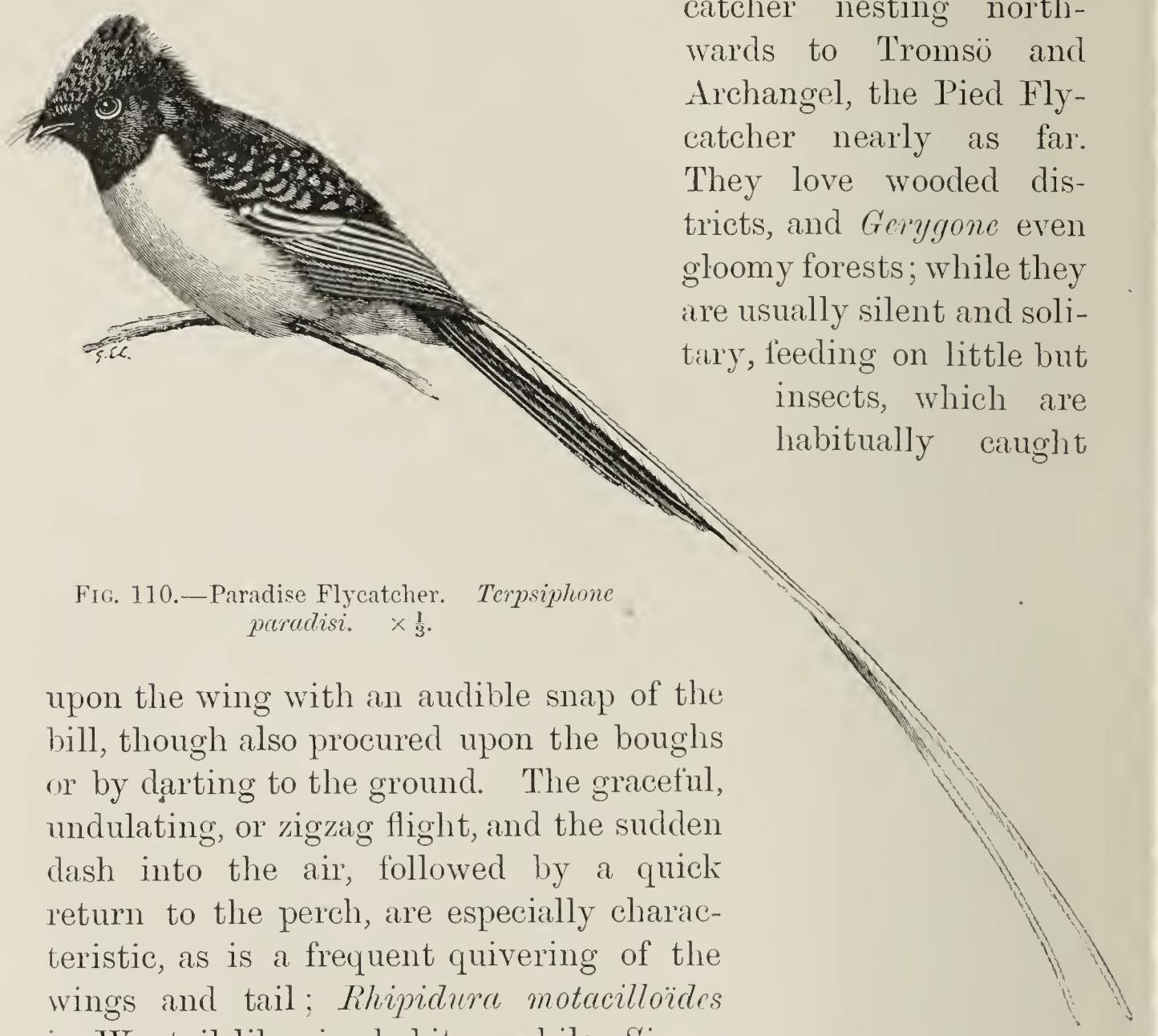

Fig. 110.—Paradise Flycatcher. *Terpsiphone paradisi*. $\times \frac{1}{3}$.

Smicrornis clings to the branches like a Tit; *Niltava* and other forms eat berries and the like in late summer; *Eopsaltria* and *Gerygone* are very fond of insect-larvae. The voice is usually faint, but is harsh in *Terpsiphone*, *Smithornis*, and *Batis*, croaking in *Piezorhynchus* and *Lanioturdus*; *Sisura* whistles; *Gerygone*, *Malurus*, and our Pied Flycatcher, have pleasing Redstart-like songs; while that of *Microeca*, which often soars aloft when singing, is said to resemble the strain of the Chaffinch. The neat nest, usually formed of grass, moss, leaves, bark, fibres, or hair, and not infrequently decorated with lichens or cobwebs, is placed in low forks or cavities of trees, if not among creepers or outgrowths on banks, *Terpsiphone* preferring higher situations. *Gerygone* builds a covered pear-shaped structure, with or without a protecting porch, of like materials, lined with fur or feathers, and suspends it in shrubs; *Malurus* and *Smicrornis* make rounder fabrics; while that of *Ochromela* is somewhat similar, but is composed of grass and ferns, and usually placed in low vegetation. The eggs, in number from two to six, are greenish- or buffish-white, with red, brown, or rarely grey, spots and blotches; exceptionally they are uniform light blue, as in *Muscicapa atricapilla*; white, as in *Chelidorhynx*; apple-green, green-blue, or whitish, with reddish-brown, yellowish, or lilac markings, as in *Eopsaltria*; or white, with red or purplish spots, as in *Malurus*, *Chasiempis*, and *Gerygone*.

Fam. VII. **Turdidae.**—This group is here divided into five Sub-families, (1) *Turdinae* or Thrushes and their allies; (2) *Myiodectinae*; (3) *Sylviinae* or Warblers; (4) *Polioptilinae*; and (5) *Miminae* or Mocking-birds. The first and third of these are often considered separate Families, but they are so closely connected by the Saxicoline and Ruticilline forms that they can hardly lay claim to such rank, while the *Accentorinae* and *Regulinae* of certain authors seem unnecessary. The *Miminae* shew some affinity to the Wrens (*Troglodytidae*).

Sub-fam. 1. *Turdinae*.—In this section the bill is usually rather long and stout, being notched but hardly curved, with few, if any, basal bristles; it is somewhat hooked in the so-called genus *Geocichla* —where it is much lengthened in five species, and abbreviated in *G. princii*; large, broad, and arched in *Turnagra* (a doubtful member of the Family); comparatively short and slender in *Sialia*, *Ruticilla*, *Erithacus*, *Saxicola*, and so forth; more robust in *Accentor*. The metatarsus is long in *Catharus*, *Calliope*, and *Notodela*, but

is usually moderate, being particularly strong in *Geocichla, Nesocichla, Zoothera,* and *Turnagra ;* in *Saxicola, Erithacus,* and *Daulias* it is at once slender and elongated. Generally the anterior scales are fused together, forming an ocreated covering (p. 10), but the opposite sometimes occurs, as in *Accentor, Nesocichla,* and *Thamnobia.* Typically the wing is fairly long and broad, with abbreviated outer primary, the next feather being emarginated in some species of *Myrmecocichla ;* but in Dr. Sharpe's group Thamnobiae,[1] it is generally abbreviated and more rounded, in *Sialia* it is pointed. The tail may be long and wide, as in *Turnagra,* or comparatively short, as in *Monticola* and *Pratincola,* but is usually of medium length ; it is normally square or rounded, though emarginated in *Sialia,* and much graduated in *Copsychus* and *Cittocincla,* while in *Cossypha natalensis* it has pointed feathers. *Turdus* (*Geocichla*) *varius, T. horsfieldi,* and *T. hancii* have fourteen rectrices.

The coloration is ordinarily plain black or brown, more or less varied with grey, white, rufous, or chestnut, occasionally in the form of a collar ; many Thrushes, moreover, exhibit the characteristic white breast spotted with brown. The bill is frequently orange or yellow. As examples of the genus *Turdus* we may take our native Blackbird, Mistletoe- and Song-Thrushes *T. merula, T. viscivorus,* and *T. musicus ;* our summer visitor the Ring-Ousel, *T. torquatus ;* our winter immigrants the Redwing and Fieldfare, *T. iliacus* and *T. pilaris ;* the American "Robin," *T. migratorius ;* and the Ground-Thrushes ("*Geocichla,*") with their light patch under the wing. The sexes are commonly alike, but black or grey males have usually brownish females. A bushy crest occurs in *Catharus.*

Of some ten Rock-Thrushes (*Monticola*), *M. saxatilis* occurs exceptionally in Britain. It has a cobalt and blackish-blue head, neck, and upper back, a nearly white mid-back, brown remiges, chestnut lateral rectrices and lower surface. *M. cyanus* is almost entirely blue. The browner hens are generally spotted and barred below. *Cochoa viridis* is green and black, with blue-green under parts, and blue on the head, tail, and wings ; *C. purpurea* has the bright colours replaced by purplish-brown and lavender ; *C. azurea* is mainly rich blue, becoming purple below. The females are duller. Blue-birds (*Sialia*) are bright blue, often with chestnut breast or back, the males being the most brilliant ; *Grandala coelicolor* is indigo, with blackish wings and tail.

[1] Placed under the Timeliidae in *Cat. Birds Brit. Mus.* vii. 1883, p. ix.

In *Saxicola* (Wheatear) the rump-region is white, except in some seven species, where it is entirely or partly chestnut or buff; the plumage exhibits various combinations of jet black, chestnut, brown, grey, and white, the black shewing especially upon the breast, quill-feathers, throat, lores, or ear-coverts. The females may be similar to the males or browner. *Pratincola rubetra*, our Whinchat, is mottled with brown and buff above and is buff below, having a superciliary streak and wing-bar of whitish; *P. rubicola*, the Stonechat, is blacker on the back, and has the head and throat

FIG. 111.—Mistletoe Thrush. *Turdus viscivorus*. $\times \frac{5}{11}$.

black, but the breast rufous, while the hen lacks the black head. Other species have white rumps or tails, and the breast or even most of the plumage black. *Oreicola* has three black members with white under parts; *Myrmecocichla* eight, which are grey or brown, relieved by black, white, and buff. The Australian and Pacific "Robins" (*Petroeca*), of very doubtful affinity, are blackish or greyish, with scarlet or pink breasts, and some white above; one having a red head. Our Redstart, *Ruticilla phoenicurus*, is grey, with brown wings, chestnut breast, rump, and lateral rectrices, black face and throat; the hen being brownish above and buff below, with less brilliant chestnut tints. The Black Redstart is dark grey, with brighter rufous rump and tail, black lower parts,

and a white wing-patch; brown replacing the grey and black in the female. Some species are blacker above, one has a chestnut back and no black throat, another has both rump and tail black, and three have blue on the forehead and crown, one of these again having a white gular mark. *R. moussieri*, linking the Redstarts to the Chats, is black, with orange-rufous rump, tail, and lower surface, a white alar spot, and white extending from the forehead to the face. The Robin,[1] *Erithacus rubecula*, needs no description; the Persian *E. hyrcanus* hardly differs; the similar Japanese Robin, *E. akahige*, has a grey belly; the Corean *E. komadori* is orange-chestnut above, black and white beneath. The Bluethroat, *Cyanecula suecica*, is brown, except for a white superciliary streak, bay tail-coverts, and a bright blue throat with a central rufous spot, to which succeed black, white, and rusty bands, and a whitish belly. *C. wolfi* lacks the gular spot, *C. leucocyana* has it white. *Calliope camtschatcensis*, *C. pectoralis*, and *C. tschebaiewi*, are brown or dark grey, with grey or black breasts, white abdomens, some black and white on the face, and glossy scarlet throats. *Daulias luscinia*, our summer visitor the Nightingale, and the larger eastern *D. philomela* are russet-brown in both sexes, with redder rump and tail, and whitish lower parts. *D. hafizi* of Persia is intermediate (*cf.* p. 506).

FIG. 112.—Redstart. *Ruticilla phoenicurus*. $\times \frac{1}{2}$.

Our Hedge-sparrow, *Accentor modularis*, is brown streaked with blackish, and shews bluish-grey on the head, throat, and breast; but the Alpine Accentor, *A. collaris*, which rarely visits Britain, has a white throat spotted with black, and flanks mottled with chestnut; while their congeners exhibit rufous lower parts or pectoral bands, black throats, or whiter wings and tails. *Ephthianura* is grey, brown, black and white above, with the crown, rump, and breast crimson in one species and yellow in two;

[1] The American Redstart is *Setophaga ruticilla* (Mniotiltidae), the Cape Robin is *Cossypha caffra*, the Indian Robin *Thamnobia*, the New Zealand Robin *Miro*.

of the latter one has a black mark on the breast, as has a fourth form with a white lower surface.

In the Thamnobiae the sexes are alike, or the females duller. The colour, as in *Callene* and *Copsychus*, may be dull blue and cobalt, purplish- or bluish-black, or bluish-grey, often with white rump: or, as in *Cossypha* and *Thamnobia*, grey, brown or blackish, with orange-chestnut or rufous rump, tail, and abdomen. Stripes of black and white often adorn the face, the ruddy hue occasionally tinges the breast, nape, or wing, while a blue alar patch or a white head occur exceptionally. *Cittocincla* is intermediate in coloration; *Alethe* is chiefly chestnut or rufescent-olive above, but grey and white or creamy buff below, with orange crown in two cases. *Turnagra* has brown upper parts with reddish tail, and the lower surface either grey with white throat, or whitish with dusky stripes; *Cichladusa* is similar, or has buff under parts, with black spots and gular crescent. All the above frequently exhibit white on the wings or tail. *Lamprolia* is velvety-black, with blue spangles on the head and neck, and white rump-region; *Tarsiger* is either blue above, varied with black, white, olive, or yellow, and with more or less orange below, or lacks the blue entirely. *Aedonopsis* and *Phacornis* are brown, with grey and white under parts.

In the Turdinae the young are constantly spotted, as opposed to the Sylviinae.

Sub-fam. 2. *Myiodectinae*.—These birds differ from the *Turdinae* in their short, somewhat depressed bills, and strong rictal bristles. *Myiodectes* and *Cichlopsis* are in both sexes fairly uniform brown, grey, or blackish, with a grey lower surface, and occasionally chestnut or orange throat and belly; one species of the former, however, is cinnamon, with black head and under parts, and a white band across the cheeks.

Sub-fam. 3. *Sylviinae*.—Besides the typical Warblers are here included most of Dr. Sharpe's groups *Bradypteri* and *Cisticolae*,[1] but not, of course, the American "Warblers" (*Mniotiltidae*). They differ from the Turdinae in being smaller, with the bill usually weak and slender, though it is very stout in *Rhopophilus* and *Arundinax*; a few genera shew strong rictal hairs; while *Regulus* has the nostrils covered by one or more peculiar bristly feathers. The metatarsus is sometimes scutellated anteriorly; the wings are comparatively

[1] *Cat. Birds Brit. Mus.* vii. 1883, pp. x. xi. (Timeliidae).

short and broad. The tail, which in some twenty genera contains but ten feathers, varies from square to rounded, being rarely emarginated, but not uncommonly graduated, as in *Locustella*, *Cisticola*, and elsewhere; it is much lengthened and widened in *Laticilla*, broad and soft in *Bradypterus*, and so forth. In *Sphenoeacus*, *Dromaeocercus*, and the still longer-tailed *Stipiturus* the rectrices are spiny with curiously decomposed webs; in *Orthotomus* the median pair are elongated during summer in the male; in *Sylviella* the rump-feathers nearly hide the tail itself.

The usual coloration in both sexes is plain greyish or brown, with rufous, buff, white, or yellowish lower parts, and frequently spots, stripes, and streaks. Many forms, however, shew more or less black or red hues, often in the form of a cap; others, as *Cryptolopha*, *Habrornis*, *Tickellia*, and *Phyllergates* exhibit brilliant yellows and greens, relieved by grey, black, chestnut, and white; *Orthotomus* and some species of *Prinia*, *Hapalis*, and *Euprinodes* are hardly duller; while *Phylloscopus*, *Acanthopneuste*, *Regulus*, *Hypolais*, *Neornis*, and *Acanthiza* vary from yellow-green to brown and buff above. *Regulus*, *Phyllergates*, and certain members of *Cisticola*, have red, orange, or yellow crowns; *Acanthiza* has scaly frontal feathers; the male of *Stipiturus* a blue throat; *Myiomoira* is black and white, with a yellow and orange breast in one case; *Stiphrornis* has an orange throat in two; *Leptopoecile* shews a blue wash on the rump and lower surface.

Sub-fam. 4. *Polioptilinae*.—The Gnatcatchers, with the sole genus *Polioptila*, have very slender bills, moderate rictal bristles, metatarsi scutellated anteriorly, shortish wings, and graduated tails. They are blue-grey above, with black rectrices, externally marked with white; and are greyish or white below. White shews occasionally on the wing, and some males have black heads.

Sub-fam. 5. *Mimimae*.—The American Mocking-birds have fairly long bills, which are little decurved except in *Harporhynchus*, but are frequently notched, and bristly at the gape. The metatarsi are usually strong and distinctly scutellated in front, though more slender in *Oreoscoptes* and *Melanoptila*, and sometimes quite smooth in the latter and *Galeoscoptes*; the wings are shortish and rounded, with well-developed outer primary; the tail is rather long and is generally broad and much graduated, but is narrower and squarer in *Oreoscoptes*. The usual coloration is dull brown, rufous, and grey, varied by white on the remiges and rectrices, and by an occasional

black cap or chestnut vent; *Melanoptila*, however, is uniform purplish- or bluish-black, *Rhodinocincla* rosy or rufous below in the male and female respectively, with superciliary streak to match. *Oreoscoptes*, *Mimus*, *Cichlherminia*, and *Harporhynchus* often shew spots beneath and *Donacobius* dusky bars, *Mimus trifasciatus* has a dark chest-band.

The Turdidae occupy the whole globe, being characteristically, though not invariably, migratory.[1] Of the Turdinae, Thrushes abound in the Neotropical Region, and — if we include the Ground-Thrushes — are common in the Ethiopian, Indian, and Australian, but the Palaearctic and Nearctic are poorly supplied: Chats, Robins, Redstarts, Nightingales, Hedge-sparrows, and their nearest allies are mainly Palaearctic, Ethiopian, and Indian; though *Sialia* reaches America, *Pratincola* Celebes, and *Petrocca* Samoa. *Nesocichla* is restricted to Tristan da Cunha, *Turnagra* to New Zealand, *Phaeornis* to the Sandwich Islands; while Madagascar possesses peculiar forms both of this Sub-family and of the Sylviinae. The last-named, however, are chiefly Palaearctic, and visit the southern Old World in winter; yet two species of *Acrocephalus* breed in Australia, *Miro* and *Myiomoira* occupy New Zealand, *Tutare* and *Psamathia* are Polynesian, one species of *Phylloscopus* reaches Alaska, *Regulus* occurs thence to Panama, and so forth. The Polioptilinae and Miminae inhabit North and South America; the Myiodectinae range from the more western United States to Bolivia and Brazil. Of the last groups several forms are confined to the Antilles, and of the Miminae three to the Galápagos.

Thrushes inhabit wooded country, and reach an altitude of twenty thousand feet in some latitudes; they feed chiefly on the ground, where they hop about scratching or searching for worms, molluscs, and insects. Snails are habitually cracked on some favourite stone by the Song-Thrush, and fruit is also eaten. The strong rapid flight is undulating and frequently low, but flocks cover vast distances on migration; Ground-Thrushes are naturally more terrestrial and resident, while the solitary Rock-Thrushes haunt stony hills, rocks, and ruins. This Sub-family comprises some of our very finest songsters, the Song-Thrush or Mavis vying with the Nightingale, which gladdens both day and night, and the Blackbird uttering delightfully mellow notes; but chirping sounds and harsher screams are common. *Phaeornis*

[1] For new British species, see Saunders, *Manual Brit. Birds*, 2nd edition, 1897-9.

sings prettily. The typical Turdine nest is a massive cup of grass, cemented with mud and inlaid with finer herbage; but other materials are constantly added, while mud, dung, or rotten wood constitutes the lining in the case of the Song-Thrush, and occasionally elsewhere. It is usually placed in trees or bushes, but not infrequently in cavities in trunks, walls or rocks, and sometimes on the ground in heather, banks, and so forth. The eggs may be greenish or bluish with reddish-brown or purplish spots and streaks, or glossy blue with or without black or brown markings; Rock-Thrushes have them light blue with faint stains, or pinkish with rusty freckles, *Turnagra* whitish with black-brown spots.

As regards the Saxicoline and Ruticilline forms attention should be drawn to the jerky, flitting flight, the "chacking" alarm-note and the rarer song of our Wheatear, the similar habits of our Stonechat and Whinchat, not to mention other allied forms; as well as to the pleasant notes of Redstarts, Redbreasts, Blue-throats, and Hedge-sparrows, and the common habits of hopping, flirting the tail, and drooping the wings. The nests of Chats consist of grass and moss, often lined with hair, feathers, or fur, and are usually placed in holes of various descriptions, or in rough herbage; the four to seven blue, greenish, or even whitish eggs being spotted or zoned with rufous, except in a few instances, such as our Wheatear, where markings are rare. Deserts and stony or furzy flats are favourite haunts. *Petroeca* adds bark, fibres, cobwebs, or lichens, and chooses sites in forks, or holes in trees and walls; the greenish or buffish eggs being marked with purplish, brown and grey. *Cyanecula* and *Nemura* select hollows in marshy spots, building with moss, grass, and leaves, like Robins; but the former, instead of reddish-white eggs with rufous spots, has them olive-coloured or dull greenish with faint rusty markings, as have the Nightingales, which place their fabric of oak or beech leaves on the ground or in low shrubs. *Copsychus, Cossypha, Catharus,* and *Thamnobia* nest as Robins do, in holes in banks, trees, or walls, and have similar eggs; Redstarts deposit five or six, which are light blue or white and very rarely spotted, in a structure of grass, moss, roots, hair, and feathers, placed in cavities of trees or masonry; *Tarsiger* and *Notodela* prefer hollows in banks and rocks, and lay blue and salmon-pink eggs respectively. *Hodgsonius* and *Larvivora* also have them blue. *Chimarrhornis* and *Rhyacornis* nidificate like Redstarts, but their eggs are greenish-white with rufous or yellowish spots; the shy

Cittocincla haunts thick woods, and deposits four oily-green eggs, with brown and purplish spots and dashes, on a bed of leaves and grass in holes in trees; the unsuspicious *Sialia* utilizes cavities in stumps or buildings, the nest and its contents resembling those of a Redstart. The breeding habits of the Hedge-Sparrow need no description, and those of the Alpine Accentor differ little, except that rocky sites are chosen.

In the above section the number of eggs varies from four to seven. The flight is feeble as compared with that of Thrushes, most species feeding chiefly upon the ground and being more insectivorous, though Redstarts and Chats will take insects on the wing.

The habits of the active Sylviinae are much more uniform; they seldom fly far, except on migration, and a few flit about like Wrens; while *Amytis, Stipiturus, Sphenura,* and some species of *Aedon* run, or hop among the herbage, with upturned tail. They frequent trees, bushes, long grass or reeds, seldom flocking as does *Regulus,* and live on insects and their larvae, small molluscs and fruit, the first-named being either caught in the air or sought upon the leaves and branches. The song is usually clear and sweet, though often plaintive, metallic, or whistling; the Willow- and Wood-Warblers (*Phylloscopus*) trill: the Black-cap and Garden-Warblers (*Sylvia*) have beautiful songs, as well as grating alarm notes; the Cataract-bird (*Origma*) runs along rocky water-courses emitting shrill cries; the Reed- and Sedge-Warblers (*Acrocephalus*), the skulking *Cettia,* and other marsh- and grass-frequenting forms, utter more or less jarring sounds, generally from some bush, whence they quickly drop to cover; while the Grasshopper-Warblers (*Locustella*) have a peculiar cricket-like note.

The nest may be a thin or fairly substantial cup of grasses, bed-straw (*Galium*) and the like, occasionally lined with hair, and placed in bushes or rank herbage, as in the Black-cap, Garden-Warbler and White-throats (*Sylvia*); or a firmer structure, including wool, moss, feathers, reed-flowers, or even lichens, built on the ground, in shrubs, in sedge, or between reed-stems, as is the case in *Locustella, Acrocephalus, Aedon,* and *Hypolais. Phylloscopus,* as well as some African and many Indian and Australian members of the Sub-family, fashion a round ball of grass and a little moss, lined with finer grasses, hair, down, or feathers, and generally place it close to the earth; *Regulus* hangs a cup of moss and spiders' webs, bedded with feathers, below the end of a conifer or other

branch, or even builds it in creepers. Savi's Warbler (*Locustella luscinioïdes*) makes a Rail-like nest of broad grass-blades (*Glyceria*) in sedges, *Myiomoira* one of bark, grass, wool, moss, and fibres in holes in trees, *Miro* a similar fabric on their branches, *Acanthiza* a domed hanging structure of like materials, *Origma* a ragged pendent mass of moss and roots, lined with fur or feathers, under rocks. *Orthotomus* (Tailor-bird) and some species of *Franklinia*, *Prinia*, and *Cisticola* stitch together the edges of a leaf or leaves to sustain their nest of grass, cotton, wool, and hair.

The number of eggs is generally from three to six, but as many as twelve are found in *Regulus*. The colour is buffish-white with brownish and violet-grey spots in Savi's Warbler; pinker with delicate red-brown freckling in the Grasshopper-Warbler; rich red-brown in *Cettia* and *Chthonicola;* similar or varying to blue, green, white or pinkish, with or without red or brown spots, in *Prinia*—even in the same species; little different in *Cisticola;* bronzy-brown in *Pyrrholaemus;* white or purplish with dark markings in *Scricornis;* white in *Origma* and *Cryptolopha*. In *Sylvia* the eggs are greenish- or yellowish-white with olive, brown, green, or reddish spots; in *Acrocephalus* they are decidedly greener; in *Aedon* greyer with brown and dull violet markings; in *Phylloscopus* and *Acanthiza* white, usually with dark red or purplish spotting; in *Hypolais* lilac-pink with blackish or brown blotches or streaks; in *Regulus* white, freckled or entirely suffused with yellowish or ruddy dots.

Myiodectes frequents woods and thickets, and has somewhat Thrush-like habits; the voice is powerful, clear and metallic; while the food consists chiefly of berries, though insects are hawked for in the air. The nest, placed on bushes, stumps, banks or rocks, is made of sticks lined with soft materials, or of twigs, roots, and moss, and contains from three to six eggs, not unlike those of the Redbreast.

Polioptila haunts tall trees or shrubs in pairs or small companies; the habits are restless, the flight is quick, the food consists of gnats and so forth, commonly captured on the wing. The purse-like nest is felted with bark, fibres, and down, and decorated with lichens; it is woven to boughs, stems, or creepers, and contains four or five greenish- or bluish-white eggs, marked with red-brown, lilac, and grey.

Of the Miminae, *Mimus polyglottus* is the Mocking-bird in

chief; the natural song being rich, varied, and powerful, and the imitations ranging from the yelp of the Eagle to the noises of the farm-yard. It is found from the United States to Mexico and the Antilles, where in isolated trees, hedges, or brambles it makes a bulky platform of rough twigs to support the cup of roots, wool, and so forth, which contains the four to six pale greenish-blue—or rarely buffish—eggs, with brown and purplish markings. The movements are energetic but graceful, the flight Thrush-like; the food consists of insects, often taken in the air, and fruit. *Mimus modulator*, the "Calandria," of Argentina, Brazil, and Bolivia, feeds chiefly on the ground, and can hardly be said to mock, though *M. triurus* of the same countries does so. *Galeoscoptes carolinensis*, the Cat-bird, besides an attractive song, utters clucks, whistles, and mewing sounds; it feeds chiefly on insect-larvae, and deposits from three to five deep greenish-blue eggs in a nest of twigs, bark, and plant-stalks lined with grass. *Oreoscoptes*, of the North American sage-brush districts, resembles *Mimus* in its habits, nest, and eggs, but is no mimic; nor, it may be added, are the shy Thrashers (*Harporhynchus*), which commonly haunt arid situations, placing their large, flattish nest of coarse twigs, leaves, fibres, bark, grass, and moss, lined with softer materials, in low trees or thorny scrub. Their three to six eggs are white, bluish, greenish, or buff, with yellowish, purplish, or red-brown spots or specks, those of the more terrestrial *H. crissalis* being uniform pale greenish-blue. *Donacobius* frequents reeds, but possibly does not belong to this group; *Melanoptila* has a harsh or mewing note, and lays blue eggs, as does *Melanotis*.

Fam. VIII. **Cinclidae**.—The Dippers or Water-Ousels form a single genus, *Cinclus*, probably more akin to the Wrens than to the Thrushes. The bill is moderate and straight, without bristles at the gape, the maxilla being slightly curved and notched; the smooth metatarsi are fairly long and strong; the wings are abbreviated, rounded, and concave; the tail is extremely short, and the whole body peculiarly squat-looking. The colour above is normally greyish-black or brown, *C. ardesiacus* being, however, delicate grey; the lower parts are similar or white, commonly with a black belly, while a chestnut band crosses the breast in the British *C. aquaticus* and in *C. albicollis*. White spots often occur above and below the eye; *C. leuconotus* and *C. leucocephalus* have nearly white heads, and the former shews white on the back.

The sexes are alike, but the young are spotted. Both plumage and down are close and nearly impervious to water.

These birds range throughout the Palaearctic Region, just reaching the southern slopes of the Himalayas, China, and Formosa. One species occupies the Atlas Mountains, while others occur along the heights of Western America, and the Andes southwards to Peru. Individuals of a dark form from Northern Europe occasionally stray to Britain, but such migration is exceptional.

Fig. 113.—Dipper. *Cinclus aquaticus.* $\times \frac{5}{13}$.

Dippers frequent rapid streams in hill-country, which seldom freeze, and appear as cheery in winter as in summer; their flight is powerful, rapid, and direct, with quick wing-strokes and sudden descent; their cry upon the wing is loud and clear, their song when stationary Wren-like. They sit on stones in the water, bobbing up and down and jerking their tails, while they use both legs and wings below the surface, whither they dive noiselessly in search of insects, their larvae and pupae, or molluscs. Fish-spawn has not been found in the stomach. The domed, but flattened, nest is composed chiefly of moss or grass, with an inner bed of dry materials, which are generally oak or beech leaves, though in India sometimes ferns and roots. It is affixed to rock-faces, ledges, or boulders in streams, placed in crevices of masonry, or even built in holes in the soil or in débris caught on bushes, common situations being behind water-falls, under bridges, or beside mill-wheels. *C. albicollis* seems to make an open fabric in Italy. From four to seven dull white eggs are laid very early in the season, two or even three sets being often produced—occasionally in the same nest. This the young sometimes leave by the end of March, being able to swim before they are fully fledged.

Fam. IX. **Troglodytidae.**—The Wrens have their headquarters in Tropical America, but even reach Greenland, Patagonia, and the Falkland Islands. Four genera with some eight species inhabit the Himalayas, the hills of West China, the Burmese countries, Sumatra and Java; while *Troglodytes*, including the common Wren, occupies most of the Palaearctic and Nearctic Regions. An altitude of eleven thousand feet is attained in certain cases.

FIG. 114.—Wren. *Troglodytes parvulus.* ×$\frac{4}{7}$.

The bill is generally moderate, slender, and somewhat arched; being, however, stouter and almost hooked in *Thryothorus* and *Campylorhynchus*, much elongated in *Catherpes*, *Salpinctes*, and *Microcerculus*, high and compressed in *Cyphorhinus*, remarkably conical, straight, and pointed in *Sphenocichla*. The maxilla may be notched, but rictal bristles are almost entirely absent. The long robust metatarsi are scutellated anteriorly, except in *Pnoëpyga*; *Salpinctes* shews scales behind; *Cistothorus* has a very large hind claw. The wings are rounded and concave; the tail is usually short and graduated, though it is exceptionally long in *Cinnicerthia*, *Sphenocichla*, and *Urocichla*, and is hardly visible in three species of *Pnoëpyga*. The last-named genus has only six rectrices, *Urocichla* has ten. The coloration is ordinarily brown, with a great tendency to barring; spots, stripes, and streaks are not uncommon; chestnut, bay, orange, and grey often relieve the dulness; *Troglodytes formosus*, *Catherpes*, and *Henicorhina* exhibit white spots above or even below; and two species of *Microcerculus* have a white alar bar.

Wrens frequent marshy, as well as dry or rocky localities, being familiar and yet wary; they habitually hop about with upturned tails, fly sharply from cover to cover, and hunt for insects, their larvae, and spiders, among fallen leaves, in crevices of rocks, and so forth, while they occasionally eat worms, small molluscs, crustaceans, and seeds. The characteristic note is shrill and Warbler-like, though harsher sounds accompany it, but *Cyphorhinus cantans*, the

Organ-bird of the Amazons, *Troglodytes domesticus* (*aedon*), *Microcerculus*, and other American forms utter melodious flute-like strains. The nest is usually a domed structure of ferns, grass, moss, leaves, or even twigs, often lined with hair or feathers, which is placed in bushes, hedges, cacti, reeds, and cavities of masonry, or on trees, rocks, banks, and the like; *Salpinctes*, *Cutherpes*, *Urocichla* and sometimes *Pnoëpyga* make no covering; *Campylorhynchus* fashions a large purse-like structure, with a long passage for entrance. The eggs vary in number from three to nine, and are white, with or without spots or freckles of red, purplish, or brownish; in *Thryophilus pleurostictus* they are said to be blue.

Fam. X. **Chamaeidae.**—This contains only *Chamaea fasciata* and *C. henshawi* of California, which by various American authorities have been referred to the Wrens or the Tits, though not agreeing closely with either. This is the only *Family* of land birds peculiar to the Nearctic Region. In both sexes the lax plumage is brown above and buffish below, with faint tail-bars and pectoral streaks; the bill is short, straight, and compressed, and is furnished with rictal bristles; the metatarsi are stout and nearly smooth; the wings are rounded and concave; the tail is graduated. *Chamaea* inhabits dry plains and bushy hill-sides, flits about or searches for insects with elevated tail, utters a Wren-like trill, and builds a nest of twigs and grass in low bushes, adding hair or feathers to the lining, and laying three or four pale greenish-blue eggs.

Fam. XI. **Hirundinidae.**—The Swallows and Martins compose a well-defined cosmopolitan Family, certainly far removed from the Swifts (p. 420), with which they used to be joined. The latter have ten tail-feathers, and hardly any scutellation on the legs, the former twelve rectrices, and an anteriorly scutellated metatarsus. The bill is short, broad, and usually much depressed, being notched at the tip and split nearly to the eyes. The feet are very small and weak, with the middle digit more or less adherent to its neighbours; *Tachycineta* has a stoutish hallux, *Chelidon* feathered toes, and *Cotile riparia* a tuft at the back of the metatarsus. The wings are extremely long and pointed, while the exterior margin of the outer primary has hooked barbs in the males of *Psalidoprocne* and *Stelgidopteryx*. The tail varies in length, and is often very deeply forked, *Petrochelidon*, *Stelgidopteryx*, *Chelidon dasypus* and *Psalidoprocne nitens* having it excep-

tionally square; while the lateral feathers may be almost linear, as in *Hirundo rustica*, or even wire-like, as in *H. smithii*.

Chelidon is purplish- or bluish-black, or brown, having a white rump occasionally barred with black, and white or buffish under parts; *Tachycineta* is similar, or greener and somewhat bronzy, in certain cases lacking the white rump, in others shewing white mottlings above. *Hirundo* is glossy metallic black, with a variable amount of chestnut or rufous on the head, rump, or lower surface; the last of these regions exhibiting much white or having a black pectoral band, while streaky markings are not uncommon. *Cheramoeca* is blue, black, white, and brown above, and white below with a black breast-patch: *Progne* is either entirely blue-black or has some white beneath, *P. tapera* alone being brown, with a longitudinal band of the same colour on the white lower surface. *Atticora* is blue-black or greenish above, black and white or brown underneath; *Petrochelidon* is steel-blue with concealed white striations, the forehead, nape, rump, and most of the lower surface being chestnut, rufous, or buff, with or without stripes; *Psalidoprocne* is uniform blue, green-black, or sooty, *P. albiceps* having a white crown and chin. *Cotile*, *Phedina*, and *Stelgidopteryx* are dull brown above, the first being white, grey, brown, or rufous below, the second white with longitudinal brown streaks, and the third white and rufous with yellow middle to the breast and abdomen in two species. The plumage of most Swallows is very metallic, and white spots are often prominent on the tail feathers in *Hirundo*, *Chelidon*, *Cotile*, and *Petrochelidon*. The female is duller than the male in *Progne* only.

The range of *Hirundo* and *Cotile* is practically world-wide, reaching from beyond the Arctic Circle in summer to South Africa, India, and Brazil in winter, not to mention resident southern species; no Swallow, however, occurs in New Zealand, nor is *Cotile* found in the Australian Region. Four species of *Petrochelidon* are found in America, two in Southern Africa, two in the Australian Region, and one in India—a remarkable distribution. *Psalidoprocne*, *Phedina*, and *Cheramoeca* are Ethiopian, Mascarene (with Madagascar), and Australian respectively: *Tachycineta* and *Progne* extend over the New World from its Arctic portions to Patagonia, *Atticora* from that country to Guatemala, *Stelgidopteryx* from Canada and British Columbia to Bolivia and Brazil. *Chelidon* is confined to the Old World, migrating in autumn to Central

Africa, Borneo, and Burma. The summer migrants to Britain are *Hirundo rustica*, the Swallow, *Chelidon urbica*, the Martin, and *Cotile riparia*, the Sand-Martin. Swallows traverse immense distances on their periodical journeys, while all perhaps shift their quarters to some extent for the winter.

Hardly any sort of country comes amiss to these birds, though the neighbourhood of water is preferred, and for some species seems necessary. Spending their life chiefly in the air and alighting comparatively little, they rapidly dart, twist, double, sail aloft, or skim the water's surface in company, at times chasing each other in sport or even fighting savagely. Insects, which form the whole of their sustenance, are habitually taken on the wing, and the young are sometimes fed, or building materials snatched up, in full flight. A few species not uncommonly perch on trees, as *Hirundo rustica*, *Tachycincta albiventris*, *Petrochelidon nigricans*, *Psalidoprocne nitens* and *Procne tapera*; the last-named, moreover, is exceptional in being non-gregarious, while it flits about with depressed wings and slow butterfly-like flight when not hawking. The majority are rarely seen on the ground, unless they are procuring mud for nidification; but many roost on reeds or in their nests, and just before migration they settle in crowds on branches, fences, wires, and ridges of roofs. *Hirundo*, *Chelidon*, and *Psalidoprocne* bask in the sun on gravelly places. The twitter or warble of Swallows —uttered on the wing or at rest—and their squeaks of anger or alarm, are well-known; the scream of *Procne* and the chirp of *Stelgidopteryx* being somewhat exceptional; when excited, however, the bill is not uncommonly snapped noisily. The nest may be cup-shaped as in our Swallow, *Cotile rupestris*, *C. fuligula*, and

Fig. 115.—Swallow. *Hirundo rustica*. $\times \frac{1}{2}$.

C. concolor, and made of agglutinated pellets of mud with a lining of straw, chaff, leaves, or feathers; it may be similarly constructed but semi-ovate, with a hole near the top, as in the Martin; or retort-shaped with a tube for entrance at the side, as in several members of the genera *Hirundo* and *Petrochelidon*: in these cases it may be placed inside buildings, under eaves, against rocks or walls. *Procne*—when not accommodated with a box—some species of *Tachycineta*, *Petrochelidon nigricans*, and other forms, not uncommonly prefer holes in trees, lining them as usual, if at all; while many species of *Cotile*, *Psalidoprocne*, and *Cheramoeca* tunnel in banks, or, more rarely, choose holes in masonry. *Procne furcata* utilizes the holes of *Conurus patachonius*; *P. tapera* the nests of *Furnarius rufus* in Argentina; *Tachycineta leucorrhous* occasionally that of *Anumbius*; *Atticora cyanoleuca* that of the Dendrocolaptine *Geositta*, itself within that of a biscacha. The eggs are from four to seven in number, generally pure white in Martins, and whitish with reddish-brown, grey, and lilac markings in Swallows; but the cases are occasionally reversed. Two or even three broods are reared in a season, and tended with the greatest care. Colonies are frequently formed, especially by Bank- and Cliff-Swallows. In Britain the Sand-Martin arrives first, but the Swallow comes early in April, while individuals have even been obtained in winter.

Fam. XII. **Campephagidae.**—The "Cuckoo-Shrikes" are commonly placed near the *Laniidae*, but are possibly connected with the *Muscicapidae* or the *Corvidae*. The bill is usually strong, and of moderate length, being hooked, arched, and wide at the base; it is especially stout in *Artamides*, decidedly weaker in *Campephaga*, long and thin in *Edoliisoma*. The metatarsus may be elongated and comparatively robust as in *Pteropodocys*, *Lalage*, and *Symmorphus*, or short and less powerful, as in *Pericrocotus*; the wings are normally long and pointed, and more particularly so in *Pericrocotus*, *Lalage*, *Symmorphus*, and *Graucalus*. The tail is also fairly long, and frequently rounded, though it may be forked, as in *Pteropodocys*, and to a less extent in *Campephaga*, or graduated as in *Pericrocotus*, *Campephaga*, and *Graucalus*. The plumage is soft, with characteristically stiff shafts on the lower back; the nostrils are nearly concealed by the feathers; the rictal bristles are feeble. The usual coloration is either bluish-grey with a certain amount of black and white, or chiefly black and white. The black has generally a purplish or

a greenish gloss; while barring occurs occasionally in the cocks, and much more commonly in the hens, where the tints are duller, the grey lighter, and the hue in some cases brown or even rufous. The Mascarene *Oxynotus* is almost unique among Birds in having the males of the two species alike, the females very different. Shaft-streaks on the feathers are fairly frequent; two species of *Lalage* have a chestnut lower surface, and one the rump similar; while *Symmorphus* is either brown above and whitish below, or black and white with buff rump and under parts. *Campephaga* is green and golden-yellow in both sexes, but shews some black, white, and grey as well; *Lobotus* is olive-yellow with dark green head and throat, orange-chestnut rump and breast, greenish tail, and an orange lobe at the gape. *Pericrocotus* is usually black, adorned with lovely scarlet, crimson, orange, or yellow markings, and with a little white, but two species lack the brilliant tints, and others replace the black by brown or grey; the females in this genus usually have yellow where the males have red, though they also shew red in two cases. Three African species of *Campephaga* vary from the ordinary grey or blackish coloration in being glossy bluish-black, with scarlet, orange, and yellow shoulder-patches respectively, and one in being steel-green, with purple face and neck, and steel-blue lower surface. In these forms the females have yellow markings. Finally, *Graucalus azureus* is azure and black, with a shade of cobalt.

The restless and active members of this Family are generally seen in small flocks in wooded country, gardens, orchards, and hedge-rows. They are found up to an altitude of ten thousand feet throughout the Ethiopian, Indian, and Australian Regions, and even reach Amurland; *Graucalus* inhabits all three Regions, but *Oxynotus* is peculiar to Mauritius and Réunion. The flight is easy, undulating, and strong, though of brief duration; while the birds hop and frisk about the branches, or move briskly from tree to tree, as they examine the crevices of the bark or the leaves, and occasionally pluck the fruit. They may occasionally be noticed darting to the earth to secure caterpillars, of which they are extremely fond, or sallying into the air after insects, like Fly-catchers. *Pericrocotus* is said to hang to the boughs like a Tit; *Pteropodocys* lives chiefly on the ground. The mellow and lively notes are of a whistling or twittering nature, varied by jarring sounds; but all the species are rather silent. The nest,

composed of twigs and grass, or of moss and leaves, is usually very shallow, and is covered with lichens and spiders' webs; it is placed on slender branches of trees, or more rarely in bushes. The two to five Shrike-like eggs are brownish, whitish, or apple-

Fig. 116.—Grey "Coly-Shrike." *Hypocolius ampelinus.* × $\frac{5}{12}$. (From *Nature.*)

green, with markings of brown, rufous, or purple. Those of the isabelline-coloured *Hypocolius ampelinus*, which possibly belongs to the Ampelidae, are white with plumbeous spots.

Fam. XIII. **Dicruridae.**—The Drongos, usually associated with the *Laniidae*, range throughout the Ethiopian, Indian, and Australian regions, as far east as New Britain and New Ireland

(*Dicranostrcptus*). *Chibia bracteata* is the only species in Australia, while *Buchanga leucogenys* is said to reach Japan; *B. waldeni* is peculiar to Mayotte, and *Edolius forficatus* to Madagascar and Joanna Island. Both sexes are typically black, with a metallic gloss of blue, purple, or green, though a few are greyer or browner, or have a little white below. The variable bill is usually large and more or less curved, with a hooked tip, a notched maxilla, and fairly strong rictal bristles—much developed in *Chaetorhynehus*. The metatarsi are short, the toes small, the wings long. The tail has only ten rectrices, and is generally very deeply forked, though less so in *Dicru-*

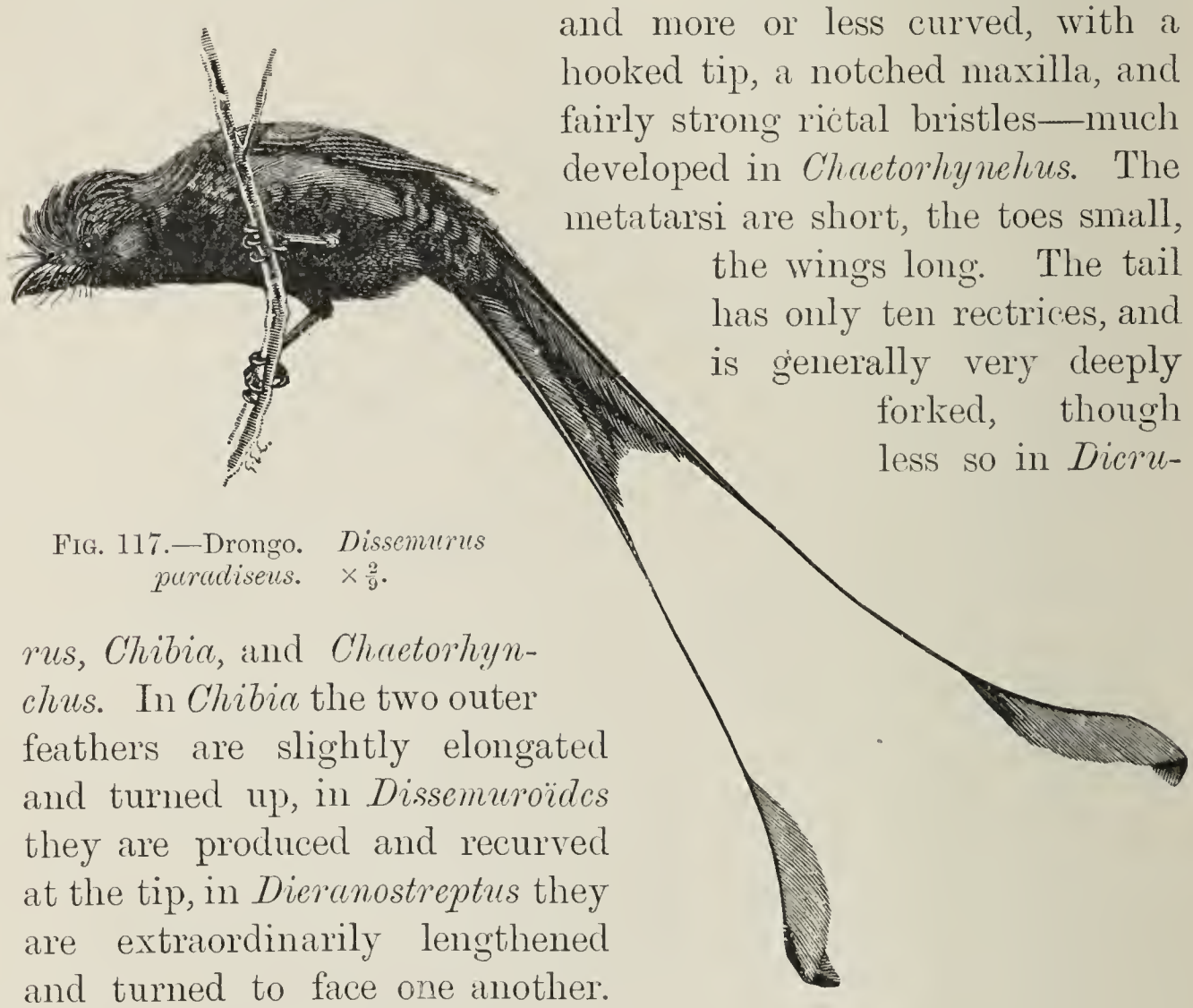

FIG. 117.—Drongo. *Dissemurus paradiseus*. ×$\frac{2}{5}$.

rus, Chibia, and *Chaetorhynchus*. In *Chibia* the two outer feathers are slightly elongated and turned up, in *Dissemuroïdes* they are produced and recurved at the tip, in *Dieranostreptus* they are extraordinarily lengthened and turned to face one another. In *Bhringa* and *Dissemurus* the long bare shafts terminate in racquets, and have a twist that brings the upper side inwards in the former, and one in the racquet itself in the latter. On the forehead a large, erect tuft occurs in *Edolius,* a still more extensive recurved crest in *Dissemurus,* a bunch of long, silky hairs in *Chibia hottentotta*. A few similar hairs are found in *C. pectoralis,* and scanty plumes in *C. bimaënsis; Dissemuroïdes* having the one or the other. Various species exhibit a tendency to lanceolate hackles on the head and neck, while the feathers of the former are scaly-looking in *Chaetorhynchus*. The bill and feet are black; the eyes red, white, or brown.

These wary, active birds frequent gardens, open country, and forests up to at least eight thousand feet, more usually in pairs

than in companies; their flight is strong and rapid, but undulating and not sustained, while they are often seen perched on bushes or exposed branches, and occasionally hover like a Kestrel. The song or whistle is ringing and melodious, varied by harsh chattering or creaking sounds; the food consists of insects of all kinds, which are captured on the ground, on leaves or flowers, on the backs of cattle, or at times upon the wing, individuals often returning to their perches like Flycatchers. Drongos are good mimics, fight viciously, and are very courageous, mastering even Hawks and Crows. The nest is a shallow cup of twigs, roots, leaves, fine grass, lichens, hair, and cobwebs, often so slight that the contents can be seen from below: it is usually woven into a horizontal fork like that of an Oriole, but may be fixed among bamboos, and often overhangs water. The eggs, rarely more than three or four in number, are sometimes plain white, but usually pink, buff, or white, with red, brown, claret, purplish, or grey spots and blotches. Not uncommonly a second set is found in a nest whence the first has been taken. A curious instance of "unconscious mimicry" is that of *Buchanga atra* and the Indian Cuckoo *Surniculus dicruroïdes*, the plumage being exactly the same, though the feet distinguish them at once.

Fam. XIV. **Ampelidae.**—In this group most forms have a short, depressed bill, though it is longer with bristly gape in *Phaenoptila*, and stouter in *Dulus;* they have abbreviated metatarsi, not scutellated in *Phaenoptila;* the wings are long and pointed in *Ampelis*, shorter and roundish elsewhere; the tails vary from short and even in *Ampelis* to long and rounded in *Phaenopepla*, or cuneate with elongated median feathers in *Ptilogenys caudatus*.

Both sexes of our irregular winter-visitor the Waxwing (*Ampelis garrulus*) are silky greyish-brown, with blackish wings, and tail relieved by yellow and white; a black forehead, eye-stripe, and throat; chestnut under tail-coverts and basal margin of the erectile crest; and, in the adults, flattened wax-like tips to the shafts of the secondaries or even the rectrices. The young are streaked below. Breeding near the Arctic Circle, and changing its quarters erratically, it occurs in the New as well as in the Old World, while in winter it migrates southwards to at least lat. 43° N. The flight is easy, graceful, and often high; the notes are of a trilling or of a chirping nature; the food consists of insects, berries, and other fruit. The nest of twigs and fibrous lichens, or

of grass and bark, is placed on firs or birches, and contains from five to seven purplish-grey or drab eggs, with spots of black, brown, or lilac. The smaller North American *A. cedrorum* lacks the yellow and white on the wing; *A. phoenicoptera*, of Japan, North China, and East Siberia, has red, but not wax-like, tips to the remiges and rectrices.

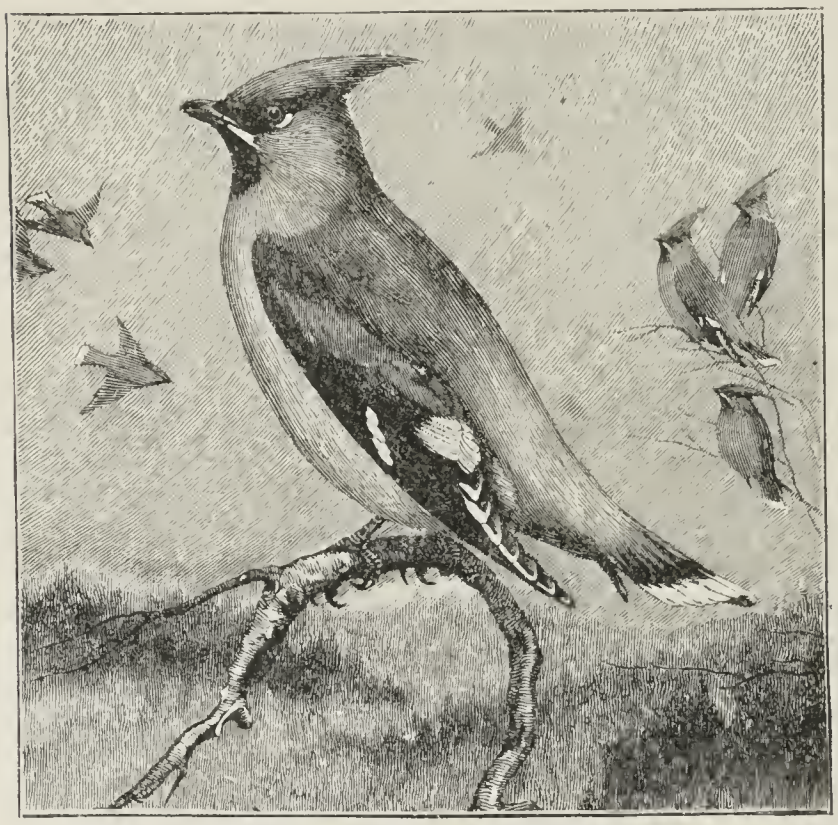

Fig. 118.—Waxwing. *Ampelis garrulus.* × $\frac{1}{3}$.
(From *Bird Life in Sweden.*)

Dulus dominicus, of San Domingo, is dark brown, varied with greenish and yellow, the yellowish-white lower surface shewing broad brown streaks. Several pairs often join their nests of twigs into a circular mass. *Phaenoptila melanoxantha*, of the Costa Rican hill-valleys, is glossy black, having an olive rump-band, and similarly coloured under parts with yellow sides and grey middle. The female is olive above with black crown. *Phaenopepla nitens*, of Mexico and the Southern United States, is bluish-black, with white on the primaries and vent-region; it has an erectile occipital crest. The hen is dark grey, with brown abdomen and a different distribution of white. This shy, active bird has the graceful movements of a Flycatcher, with a habit of jerking the tail; the song is plaintive or whistling; the food consists of insects and fruit. The flat nest, of fibres, grass, and down, contains from two to five greyish eggs, speckled with brownish-black and neutral tints. *Ptilogenys cinereus*, of the highlands of Central America, is plumbeous, with black remiges, black and white rectrices, loose broad lavender crest-plumes, and yellow under tail-coverts and flanks; the female is chiefly brown.

Fam. XV. **Artamidae.**—The "Wood-Swallows" constitute a group of very doubtful position, ranging from the Australian to the Indian Region and in one case (*Pseudochelidon*) to West Africa. In the last-named the bill is broad, but elsewhere it is

long, pointed, and slightly curved, with wide gape. The metatarsi are short and strong; the wings are much elongated; the tail is short and occasionally emarginate, with soft, exserted shafts to the rectrices in *Pseudochelidon*, which is glossy greenish-black with red beak and feet. *Artamus*, where powder-down patches occur on the sides, thighs, and lower back, exhibits black, brown, rufous, or grey tints, relieved by white—especially below, or towards the tip of the tail: the bill is blue with black extremity, the feet are greyish. The sexes hardly differ.

These woodland birds often float nearly motionless in the air, occasionally moving ahead with a few strokes of the wing; at other times they wheel and twist about like Swifts. They hawk for insects, or sally after them from their perches, feeding also upon the ground, on the larvae and on seeds. Congregating like Swallows, they have in Australia a curious habit of hanging in ball-like masses from the branches; the note is plaintive or chirping. The nests, often found in close proximity, are placed in forks of trees, on their side-shoots, in holes, behind loose bark, in deserted habitations of other birds, or in bushes; the outer materials being twigs and grass, those of the lining fibres and feathers. From two to four white, greenish, or flesh-coloured eggs are deposited, spotted and streaked with umber, red-brown, grey, lilac, or occasionally black.

Fam. XVI. **Laniidae.**—Few Families are more difficult to define than this. A typical Shrike is easily recognised; but such forms as *Pachycephala* and *Hemipus* are closely connected with the *Muscicapidae*; *Calicalicus* and *Neolestes* with the *Pycnonotidae*; *Gymnorhina* and its allies with the *Corvidae*; while some authors include the *Campephagidae*. Dr. Gadow[1] recognises five Subfamilies: (1) *Gymnorhininae*, (2) *Malaconotinae*, (3) *Pachycephalinae*, (4) *Laniinae*, and (5) *Vireoninae*; but the last-named is here allowed Family rank, while *Prionopinae* is admitted in its place.

The bill is stout, notched, and often strongly hooked, while it is either curved or straight; in *Fulcunculus* it is more than usually compressed, in *Rhectes* the maxilla has the edge finely serrated, in *Xenopirostris* the mandible is upcurved, leaving a distinct gap above it. In the *Gymnorhininae* the culmen is long, straight, and slightly rounded, with slit-like nostrils near

[1] *Cat. Birds Brit. Mus.* viii. 1883, p. 89. The *Gymnorhininae* belong to the group *Austro-coraces* or *Noto-coracomorphae*, if such be admitted; *i.e.* to the apparently generalized forms whence the *Corvidae* (p. 557) and perhaps the *Laniidae*, have sprung

the middle. The variable metatarsus is very strong in the larger forms, and much weaker in the *Prionopinae;* it is perhaps shortest in the *Malaconotinae,* where—as in all the Family—the scutes tend more or less to fuse. In *Calicalicus* and *Nicator* the basal joints of the third and fourth toes are united. The wings —usually moderate—may be very long and pointed, as in *Gymnorhina* and *Pityriasis,* or abbreviated and much rounded, as in *Telephonus* and *Laniarius;* the rather short tail is rarely emarginate, but frequently has acuminate feathers; while it may be square or rounded, or at times graduated, as in *Laniarius, Laniellus, Paeoptera, Telephonus, Pterorythrius,* some species of *Lanius,* and still more *Urolestes,* where the two median rectrices are exceptionally elongated. *Falcunculus* and *Oreocca* have well-developed erectile crests; *Rhectes, Sigmodus, Pseudorhectes,* and *Melanorhectes* also exhibit lengthened head-plumes; *Platylophus* has these feathers broad and extraordinarily long; while *Prionops* has in addition frontal feathers overhanging the nostrils. *Pityriasis* has a bare yellow crown, the ear-coverts and lower throat being covered by brown bristles with red bases: *Leptopterus, Prionops,* and *Sigmodus* have a fleshy wattle round the eye. Rictal and nasal hairs may be highly developed or absent. The sexes are generally similar, except in the Pachycephalinae, and to some extent in the Prionopinae.

Sub-fam. 1. *Gymnorhininae.*—The remarkable red and black *Pityriasis gymnocephala* inhabits Borneo; the black and white *Gymnorhina* Australia, with Tasmania; the black, white, and grey *Strepera* the same countries, *Cractieus* Papuasia also. *Gymnorhina* and *Cractieus* have the beak bluish-white. *Strepera* occurs in parties in open wooded districts or swamps, feeding chiefly upon the ground on insects, their larvae, and a little fruit; while it runs, hops, or leaps from branch to branch with great agility, but generally flies low and feebly. It is a bold bird with a shrill, ringing, oft-repeated cry. The nest, as large as that of a Crow, is placed in the fork of a low tree, and is formed of sticks and twigs with a lining of bark, grass, leaves, wool, or hair; three or four pale chocolate- or reddish-brown eggs, with faint red or lilac markings, being deposited. *Gymnorhina,* the Piping Crow, resembles *Strepera* in habits, though its single, clear notes are somewhat different, and it can be taught to whistle or mimic. *G. hyperleuca* of Tasmania is called the Organ-bird, as *Cyphorhinus* (p. 522) is in Amazonia. The eggs vary from brown to whitish,

bright green, or sky blue, with smears, dashes, spots, or freckles of lilac and brown. The shy *Cracticus* is more arboreal, and eats mice, young birds, lizards, and even crabs, in addition to insects, upon which *C. destructor* darts like a Flycatcher, impaling its prey subsequently after the fashion of a Shrike. The cry in this genus bears a general resemblance to that of the above forms: the eggs are equally variable, and may have zonal markings.

Sub-fam. 2. *Malaconotinae*.—These African and Indian birds are commonly black, white, and chestnut; *Laniarius*, however, is chiefly red, green, and yellow; *Nicator*, *Neolestes*, and several species of *Pterorhinus* shew much yellow and green; while *Artamia leucocephala* is greenish-black, and *A. bicolor* chiefly cobalt, both having the head and under parts white. The feathers of the back are very broad, soft, and fluffy. *Vanga*, *Artamia*, *Xenopirostris*, and *Calicalicus* are peculiar to Madagascar; unless *Clytorhynchus pachycephaloïdes* of New Caledonia and the New Hebrides be referred to *Xenopirostris*. Between *X. polleni* and *Tylas eduardi* (Pycnonotidae) a most curious instance of "unconscious mimicry" exists. The retiring members of this Sub-family are commonly seen hopping or climbing about thick undergrowth in search of insects and their larvae, or hunting for worms and spiders on the ground; they run well and fly fairly, while some forms, as *Dryoscopus cubla* and *D. rufiventris*, puff out their feathers until the body resembles a black and white ball. The voice of *Laniarius rubiginosus* has been compared to that of a Nightingale, and other species utter ringing notes, sweet or melancholy whistles, or at times loud, discordant cries or "churrs." The nest—where known—consists of twigs, grass, wool, hair, and feathers, and contains from three to five greenish-white eggs with brown spots; it is placed in a bush, or among close-growing plants. The male occasionally incubates.

Sub-fam. 3. *Pachycephalinae*.—This group, which extends from most of Polynesia and Australia to Tenasserim and the Great Sunda Islands, shews brown, black, white, grey, yellow, and olive hues, the yellow being somewhat characteristic. The majority of the members hop actively about leafy trees, or search the ground for insects, their larvae, and berries; *Falcunculus* takes short, quick flights, clings to the boughs like a Tit, and often tears off the bark; while *Pachycephala simplex* prefers swampy ground, and behaves like a Flycatcher. Some species have a low, mournful, reiterated note, others a continuous whistle, often ending with a

smacking sound, others again have a sweet song. The nest of *Pachycephala* is a neat, though sometimes frail, cup of twigs, roots, and grasses, often placed on horizontal boughs, and containing three or four creamy or brownish eggs, with scattered or zonal umber markings and a few lilac spots; *Falcunculus* usually selects a gum-tree, and uses bark, grass, and cobwebs, laying two or three elongated whitish eggs, with olive, black, and greyish dots or lines; those of *Oreoica* are bluer.

Sub-fam. 4. *Laniinae*.—The Shrikes proper extend over the

Fig. 119.—Great Grey Shrike. *Lanius excubitor*. $\times \frac{5}{13}$.

Palaearctic, Indian, and Ethiopian Regions, and alone of the Family occur in the New World, *Lanius borealis* and *L. ludovicianus* inhabiting North America. The lax plumage is either black, grey, and white, or is varied with rich red-brown. *Urolestes* has the feathers of the crown and neck lanceolate, and those of the sides long and fluffy; *Laniellus* is exceptional in being spotted. The young are browner, and are often transversely barred below, a fact also true of the *Gymnorhininae*. In the large genus *Lanius* are included all the British Butcher-Birds, *L. excubitor*, *L. minor*, *L. pomeranus*, *L. collurio*, the Great Grey, Lesser Grey, Woodchat

and Red-backed Shrikes, of which only the last-named breeds in our island. The Sub-family contains many of these quarrelsome, rapacious birds, often seen perched on the tops of bushes, or chasing each other along the hedge-rows. The flight is strong and rapid, but undulating and brief: the food, which may be taken on the wing, or procured upon the ground, consists of small mammals and birds, insects, snakes, lizards, frogs, or even crabs and fruit, the creatures not devoured at once being impaled on thorns or spiky leaves. The "larders" are usually near the nest, which is a bulky mass of twigs, grass, and the like, with a softer lining, placed in a thick bush or fairly high up a tree; the four to seven eggs vary from green to reddish-buff or whitish, and are spotted, blotched, and generally zoned, with brown, red, olive, green, or a little grey. Sometimes the male incubates. The usual note is harsh and grating, but shriller cries or sweeter songs are not uncommon, while certain species are good mimics. Pellets of the indigestible portions of the food are ejected after eating, as in Birds of prey, and elsewhere.

Sub-fam. 5. *Prionopinae*.—The "Wood-Shrikes" are usually dull in colour, though some have the normal browns, greys, and blacks relieved by bright chestnut, fawn, or yellowish-white, and several are black and white, or uniform black. They frequent trees and bushes, and eat molluscs and fruit: but live chiefly upon insects captured on the branches or on the ground, if not by darting into the air from a perch. Their flight, rapid but short, is commonly performed with quivering wings: they hop easily upon the ground; while their notes take the form of a rather pleasing Thrush-like song or a harsh chatter. The slight, loose nest, built in a low fork, in the hollow of a stump, or even on a rocky ledge, is made of moss, grass, bark, roots, wool, feathers, lichens, cobwebs, or downy seeds: the three eggs being white, greenish, or buff, often with brown, black, and grey blotches, dashes, freckles, or zones.

Gralliua, the "Magpie-Lark" of Australia and New Guinea, doubtfully placed here, possesses vocal organs abnormal for an Oscinine bird.[1] Graceful and tame, it frequents homesteads, stream-sides, and swamps, having a heavy, flapping flight, uttering a shrill, plaintive whistle, and plastering a nest of mud and grass on some horizontal bough. The three or four eggs are white or pinkish, marked or zoned with red, brown, and lilac.

The Helmet-bird of Madagascar (*Eurycerus prevosti*), a purplish-

[1] H. Gadow, Bronn's *Thier-Reich, Aves, Syst. Theil*, 1893. p. 281.

black and chestnut species, with a compressed, swollen and hooked steel-blue beak exhibiting a pearly interior, should perhaps stand in a separate Family, *Eurycerotidae*, and not with the Shrikes.

Fam. XVII. **Vireonidae.**—The small group of "Greenlets" ranges from Winnipeg and Nova Scotia to Argentina. The compressed or depressed beak varies from stout and strongly hooked, as in *Vireolanius* and *Cyclorhis*, to small and comparatively weak as in *Hylophilus;* both mandibles being notched, and the gape bristly. The metatarsi are usually short and robust with slightly united anterior toes, but are longer and more feeble in *Vireo;* the wings may be elongated and pointed, as in *Vireosylvia*, or abbreviated and roundish, as in *Vireo* and *Neochloe;* the tail is normally short and even, with narrow feathers, but is rounded in *Neochloe*. The frontal feathers are somewhat erect. The coloration is olive, or green and grey above—with a black, brown, ashy, or reddish cap—and is grey, whitish, or yellow beneath; the wing frequently exhibits white bands, and the head white, dusky, or rufous stripes. White or yellow orbital rings occur in *Lanivireo*, a red-brown tail in *Hylophilus ochraceiceps*, a blue crown in *Vireolanius pulchellus*, a chestnut pectoral band in *V. melitophrys*. The bill and feet are sometimes red; the eyes white, red, or yellow. The sexes frequently differ in colour.

These active and fearless birds inhabit forests up to an altitude of ten thousand feet, as well as ravines, swamps, or even streets of towns; they are usually observed in pairs among the higher branches of trees, creeping and hanging to the twigs, or chasing one another about in play. Seldom do they seek the ground, but they take fairly long flights, and dart out after passing insects, which, with the larvae and a few berries and seeds, form the diet. The continuous song consists of loud, reiterated, flute-like notes, supposed in one case to resemble "Whip-Tom-Kelly"; some forms also utter harsher chirps or mews. The nest, a deep, firm cup of leaves, grass, bark, lichens, spiders'-webs and cottony materials, lined with fibres, fir-needles, delicate stems, or rarely down, is supported by some horizontal fork, over which the rim is commonly turned; the four or five eggs are white, generally spotted with red-brown, black, or purplish.

Fam. XVIII. **Sittidae.**—The Nuthatches, though closely allied to the *Paridae*, show a certain affinity to the *Certhiidae* (p. 571). Typically they are stout little birds with long, pointed wings, and short nearly square tails; the bill is fairly long and strong, and is

straight and awl-like, being notched only in *Sitella* and *Hypositta*, and slightly upcurved in the former. Bristles usually occur at the gape, while the nostrils are concealed by the same or feathers. The metatarsi are short and powerful, the scutes being fused in *Hypositta*; the hind toe is unusually developed; the claws are long, curved, and sharp. The colours in *Sitta*, which ranges over nearly all the Palaearctic and Indian Regions, and throughout North America to Mexico, are slaty-blue and rusty-red of various shades, relieved by

Fig. 120.—Nuthatch. *Sitta caesia*. $\times \frac{3}{11}$. (From *Natural History of Selborne*.)

black and white; the slaty tints shewing chiefly above, often in combination with a black or brown cap. *Dendrophila* and *Callisitta*, of the Indian Region and Timor, are blue and black, with creamy or ochreous lower parts. *Sitella*, of Australia and New Guinea, exhibits brown, grey, black, rufous, and white, often having a white head, or a rusty or white wing-patch; *Daphoenositta*, of the latter country, adds to these hues pink at the base of the bill and on the graduated tail; *Hypositta* of Madagascar is greenish-blue, with browner head and under surface, and coral-red bill.

Nuthatches are quiet, non-migratory birds, which frequent forests or open country with old timber, where they may be seen darting quickly from tree to tree with undulating flight, or creeping jerkily in Tit-like fashion up and down the trunks or over rocks. They seldom seek their food upon the ground, but search every cranny, and dig in rotten wood for insects, their larvae, and so forth, or collect nuts, acorns, beech-mast, and seeds; while the nuts are cracked by fixing them in chinks and hammering them with the whole weight of the body, which swings backwards and forwards from the hip-joint. In winter they are exceedingly tame. The spring call is a noisy, querulous "whit-whit," recalling that of the Wryneck, but sibilant sounds and sweeter cries are not uncommon, few persons being aware that the British species (*Sitta caesia*) has at least four sets of notes, one of which is very Thrush-like. *Sitella* has a weak, piping voice. In England the nesting-cavity is usually chosen in a tree, but occasionally in a wall, haystack, or the like; this is commonly lined with scales from conifer trunks, and the entrance blocked up with a plaster of clay pierced by a round hole: abroad, however, holes in rocks are often utilized, and nests made of moss, bark, hair, and feathers. The Indian species do not always plaster up their holes, and the American apparently never do so. *Sitella* forms a curious funnel-shaped nest with a very thin rim, in forks or on branches, using as materials bark, moss, down, cobwebs, and lichens, the bark being applied externally like shingles. The three or four greenish or bluish-white eggs, with blackish, grey, or lilac markings, are very unlike those of *Sitta*, which are white, with fine pinkish-red and lilac spots or blotches, and number from five to eight.

Fam. XIX. **Paridae.**—The Tits usually have a moderate and slightly decurved bill, though it is elongated in *Sphenostoma* and *Certhiparus*, abbreviated with roundish outline in *Acredula*, *Psaltria*, and *Psaltriparus*, more pointed in *Aegithalus* and *Auriparus*; the maxilla having little trace of a notch, or the gape of bristles. The metatarsi are short, except in *Acredula*, where the legs are longer and the scales tend to fuse; the robust front toes are partially united, and possess strong claws. The wings are rounded and abbreviated, especially in *Aegithalus*; the tail varies considerably, being short and nearly square in *Parus*, long and graduated in *Acredula* and *Psaltriparus*, intermediate in *Psaltria* and *Sphenostoma*, and emarginate in *Aegithalus*. The nostrils, generally hidden

by bristly feathers, are exposed in *Nerophila* and *Sphenostoma*. Crests occur in the last-named and at times in *Parus*.

The colour of the soft, lax plumage is commonly dull; but *Parus* may be glossy greenish-black and yellow, as in the Sultan-bird (*P. sultaneus*); black with white on the wings, tail, or lower parts, as in *P. niger* and a few other African species; blue and white, with a little black and grey or a yellow fore-neck, as in *P. cyanus* and *P. flaviventris*; blue, black, greenish, yellow, and white, as in the British Great and Blue Tits (*P. major* and *P. caeruleus*); olive, brown, or grey, varied with black, white, chestnut, or buff, as in our Crested Tit (*P. cristatus*); or lastly, the tints while including but little yellow or blue, as in our Coal and Marsh Tits (*P. britannicus* and *P. palustris*), may be greyish or olive on the back, with a black head, white cheeks, and buffish-white under parts, the former species having a white nuchal patch. *Psaltria* is brown, grey, white, and buff; *Psaltriparus* is similar; *Nerophila* and *Sphenostoma* are brown, with yellowish-white, buff, or brown and white lower surface; *Certhiparus* is red-brown, with a grey nape and dull white breast. *Acredula*, containing the Long-tailed Tits, is black and white with a more or less pronounced rosy wash, or may be rufous, or brown and grey, with pinkish or fawn under parts, two species having chestnut heads. *Aegithalus* and *Auriparus* are rufous-brown, yellow-green, or greyish above, with black and white, orange-red, or yellow heads; and are commonly rufous and white, yellow, or whitish below, occasionally with bay marks. The sexes are very similar, the young often yellower.

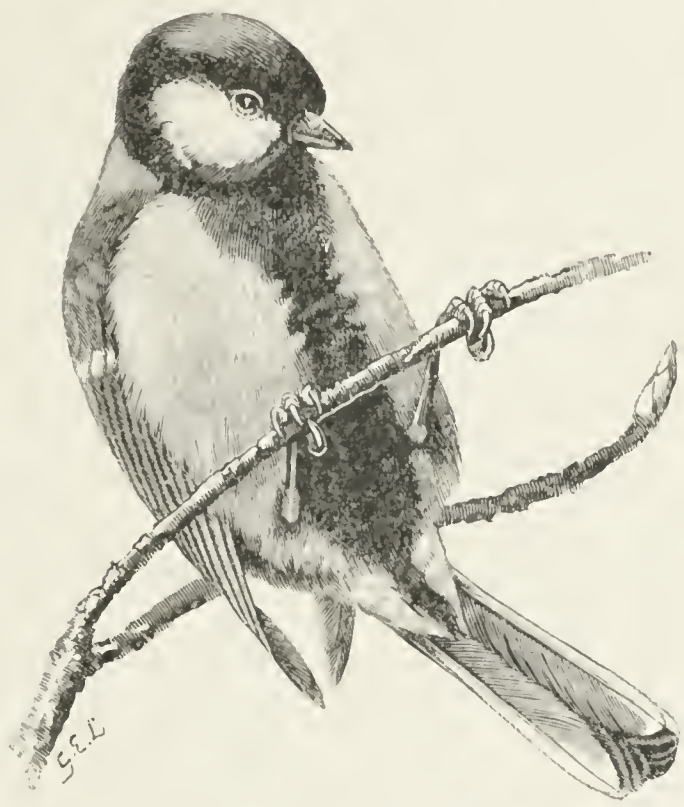

Fig. 121.—Great Titmouse. *Parus major*. $\times \frac{5}{8}$.

Titmice are ordinarily non-migratory, *Parus* occupying most of the globe, except South America and the Australian Region east of Lombok and Flores; *Psaltria* is confined to Java, *Acredula* to the Palaearctic and Indian countries, *Aegithalus* to

the same with the Ethiopian Region, *Psaltriparus* and *Auriparus* to North America, *Xerophilà* and *Sphenostoma* to Australia, *Certhiparus* to New Zealand.

These familiar birds, active and often noisy, are found in flat or hilly, open or wooded districts, up to an altitude of ten thousand feet or more. They are decidedly arboreal, seldom frequenting the ground, and usually combining into flocks, except when breeding. The food consists mainly of insects, their eggs, larvae, and pupae, but at times of conifer-seeds, acorns, beech-mast, nuts, and the like; while in winter a suspended meat-bone, fat, or crumbs, prove great attractions. No doubt a certain amount of fruit is eaten in summer, and buds are plucked in spring; but the latter commonly contain injurious grubs. The Great Tit will kill smaller birds. The flight is weak and undulating, but on the trees the birds hop, climb, cling head downwards, and pry into the crannies in most workman-like style. *Xerophila* is, however, more terrestrial. The sharp reiterated notes are varied by sibilant sounds, those of the Blue Tit being fairly representative; yet some are harsher; others, as in the Long-tailed Tits, softer; while certain Crested Tits are credited with a song. The nest is normally a mass of moss—and sometimes grass—with a felted lining of wool, hair, or fur, containing from five or six to twelve or more white eggs, which are in most cases spotted or freckled with various shades of red, but rarely with purplish or chocolate-colour. Sometimes more than one is laid in a day. The fabric is placed in holes in trees, stumps, rocks, walls, or the ground; pumps, post-boxes, and so forth are frequently selected: nooks behind loose bark, deserted habitations of other birds, or the foundations of those of Hawks and Crows are sometimes chosen; while *Sphenostoma*, and occasionally *Xerophila*, build open nests in shrubs. *Acredula*, *Aegithalus*, and *Psaltriparus* make a purse-shaped structure with an entrance near the top; the first-named, thence called Bottle-Tit, placing it in hedges, bushes, undergrowth, forks of trees, or even ivy, and using as materials, moss, wool, lichens, and cobwebs, with a thick feather-lining; the two latter generally suspend it to branches and fashion it of grass, fibres, and leaves, often adding twigs externally or down internally. *Aegithalus* occasionally makes a tubular passage. *Auriparus* deposits in a similar or bulkier nest pale bluish or greenish eggs with red-brown specks, while those of *Sphenostoma* are blue with blackish mark-

ings. *Acredula* apparently incubates with its tail over its back. The hen's bravery when sitting, her hissing challenge, and her speedy return when driven off, are characteristic of Tits.

Fam. XX. **Panuridae.**—Family rank is now pretty generally accorded to *Panurus biarmicus*, the "Bearded Tit" or "Reed-Pheasant," though its affinities are still doubtful. Dr. Gadow,[1] judging from the internal structure, inclines to the view that it is akin to the Finches, but others place it next to the Tits. The bill is short, curved, rather conical, and without a notch; the metatarsus is long and scutellated anteriorly; the wings are short and rounded, the tail is extremely long and graduated. The plumage is orange-brown above, with a grey crown and a black streak from the lores down the cheeks, where the feathers are elongated and point backwards; the wings are varied with black and white; the throat is greyish, the breast pinkish; the abdomen coloured like the back; the under tail-coverts are black, the bill is yellow. The hen has a buff head, while she lacks the black "moustache" and under tail-coverts.

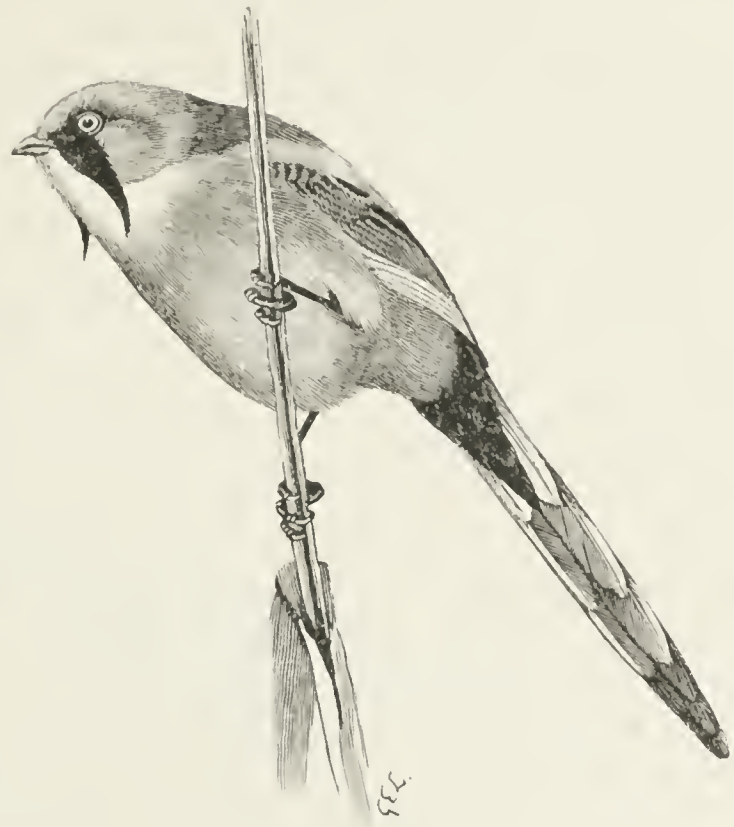

Fig. 122.—Reed Pheasant. *Panurus biarmicus.* $\times \frac{1}{2}$.

This pretty species, which ranges through most of Europe, except Scandinavia and Northern Russia, and reaches Central Asia, may be seen to advantage on the Norfolk Broads, where it is resident, and still breeds in diminished numbers. In windy weather the separate pairs keep hidden, but at other times, though shy, a quiet observer may see them flitting above the reeds, uttering their clear "ping-ping," or clinging to the flowering tops. Insects and small molluscs, with seeds in winter, constitute the food. From April to August a nest of broad grasses, sedges, and the like, lined with reed-flowers, or exceptionally with vegetable-

[1] *Cat. Birds Brit. Mus.* viii. 1883, p. 3.

down, is built in aquatic herbage, or rarely in moderately high plants, to contain the round creamy eggs with sparing brownish-black lines and scrawls. These number from four to eight, or even ten, should two hens lay together. The alarm-note is plaintive. Towards autumn the adults and young form large flocks.

Fam. XXI. **Oriolidae.**—The Old World Orioles, not to be confounded with the so-called "American Orioles" (*Ieteridae*), inhabit the Palaearctic, Indian, and Australian Regions, reaching eastward to Turkestan, China, and Papuasia. The bill is strong, rather long,

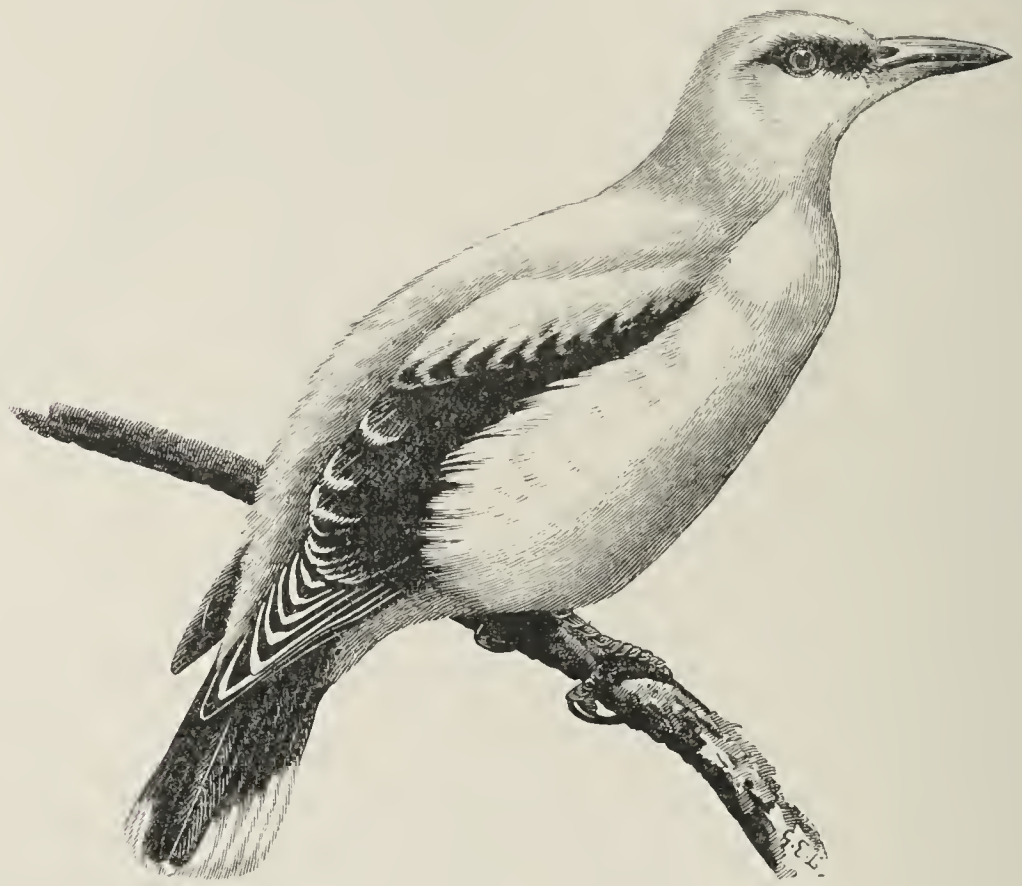

Fig. 123.—Golden Oriole. *Oriolus galbula*. $\times \frac{3}{7}$.

straight, and notched, or, in *Sphecotheres*, curved; the metatarsus is short, the toes are small, the wings are long, the tail is moderate and slightly rounded. *Sphecotheres* has naked lores and orbits. The Golden Oriole (*O. galbula*) which breeds exceptionally in England, is orange-yellow, with black lores and mainly black wings and tail; the similar Indian Mango-bird (*O. kundoo*), has a black post-ocular streak; other species shew black napes or heads. *O. viridis* and its allies are olive-yellow or brownish, often with dusky streaks, *O. steerii* being white beneath with broad black stripes; *O. eruentus* is blue-black, with crimson wing-bar and mid-breast; *O. ardens* chiefly crimson, with black head and fore-neck; *O. trailli* maroon, with black head, throat, and wings; *O. hosii* black, with

chestnut under tail-coverts. The bill is crimson, pinkish, or bluish. *Sphecotheres* is yellow-green or olive-yellow, at times brighter below, and is relieved by black, grey, and white, the orbits being yellowish or flesh-coloured, the bill blackish.

These shy, restless, and quarrelsome birds frequent gardens, groves, and mangrove swamps, avoiding the ground, flying heavily but swiftly from tree to tree, and hopping among the higher branches. They eat insects and fruit; and utter flute-like notes, varied by mewing calls or "churrs" of alarm. The nest is a pocket of bark, grass, and fibres, with the rim woven over two forking twigs—leaves, moss, and hair being occasionally added. The three to five white or salmon-coloured eggs have dark purplish or brown-pink spots, and more rarely streaks: those of *Oriolus viridis* being more dusky with brown and lilac markings. *Sphecotheres maxillaris* makes a shallow nest of twigs, and lays three olive or green eggs, blotched or zoned with red-brown.[1]

Fam. XXII. **Paradiseidae.**—The Birds of Paradise have no rivals in splendour, unless it be the Humming-birds, among which, however, there is no such marvellous development of accessory plumes. They are undoubtedly allied to the Corvidae, as is evidenced in particular by *Lycocorax* and *Manucodia*, while these also connect the more typical forms with the comparatively plainly garbed Bower-birds, often placed in a separate Family, *Ptilorhynchidae*. Few species are as large as Crows, and some are not bigger than Thrushes. Whether known to earlier traders or not, the first undoubted account of Birds of Paradise published in Europe was that of Maximilianus Transylvanus (1523), followed by that of Antonio Pigafetta, both relating to a couple of birds brought by Magellan's company from Batchian,[2] where they were called "Manukdewata," or "Birds of the gods." Natives when preserving the skins used to cut off the wings and the feet, a fact which gave rise to absurd stories of Paradise-birds (*Paradeira apoda*) never perching, gazing perpetually at the sun (*passaros de sol*), suspending themselves by the tail-feathers, and so forth. The hen was also said to lay her eggs on the back of her spouse.

[1] For unconscious mimicry of *Mimeta* (Oriolidae) and *Philemon* (Meliphagidae), cf. A. Newton, *Dict. Birds*, 1893, pp. 573-574.

[2] *Cf.* A. Newton, *Dict. Birds*, 1893, pp. 37-40; and for the Family generally, *op. cit.* pp. 48-51, 534-536, 779-780, 789-790, Wallace, *Malay Archipelago*, ch. xxxviii., Salvadori, *Ornitologia Papuasia e Molucche*, and the Monographs of Elliot and Sharpe.

The bill is usually short and stout, but is Crow-like in *Manucodia* and *Lycocorax*, long and decurved in *Ptilorhis*, *Paryphephorus*, *Ianthothorax*, *Seleucides*, and *Falcinellus*, and becomes slender and sickle-shaped in *Drepanornis;* the maxilla is in some cases notched,

Fig. 124.—D'Albertis' Bird of Paradise. *Drepanornis albertisi.* $\times \frac{2}{5}$. (From *Nature*).

and in *Scenopoeetes* bidentate. The metatarsi are strong and fairly long, the outer and middle toes are slightly united, and the hallux is large. The wings are moderate or short, being especially rounded in Bower-birds; the tail may be enormously elongated and graduated, as in both sexes of *Falcinellus*, *Astrapia*, and *Paradigalla;* less graduated and shorter, as in *Drepanornis;* of medium length,

and square or rounded, as in many forms; or much abbreviated, as in *Cicinnurus*. *Astrapia stephaniae* has the two median rectrices concave and decurved over; those feathers in the males of *Paradisea*, *Cicinnurus*, *Diphyllodes*, *Schlegelia*, *Paradisornis*, and *Uranornis* exhibiting more or less wire-like shafts, which terminate in large racquets in *Cicinnurus*, smaller discs in, *Paradisornis*. They are broader, convex above, wavy, and horny in *Uranornis*, and are curled outwardly in *Diphyllodes* and *Schlegelia*, while they cross each other twice in the last, but once in *Cicinnurus*. *Pteridophora* has an extraordinary streamer behind each eye. That these however, are by no means the only remarkable developments, will be seen from the following descriptions of the most striking species, all of which are confined to Papuasia and Australia, except the Moluccan genera *Semioptera* and *Lycocorax*. The feathering often extends over part of the bill.

Manucodia and *Phonygammus* are the only Passerine birds known to have a convoluted trachea.[1]

Ptilorhis paradisea, the Rifleman-bird,[2] is velvety-black with a purple gloss, having the head, throat, and median rectrices green, the abdomen bronzy; the crown-feathers are scale-like, and the silky flank-plumes considerably elongated. *P. magnifica* is somewhat similarly coloured, with a stiff pectoral shield of metallic green; *Ianthothorax* and *Paryphephorus*, with erectile nuchal collars, are near allies. *Seleucides ignotus* the Twelve-wired Bird of Paradise, which has six long, recurved and filiform appendages to the lax, projecting feathers of each side, is black, with purplish head, wings, and tail, bronzy back, broad erectile breast-plumes margined with emerald, yellow sides and belly. *Drepanornis albertisi* is rufous-brown, with green throat and ante-ocular region, white belly and dusky breast; the sides of the last exhibit dark-edged bronzy plumes, which can be expanded like a fan, succeeded by long grey decomposed feathers with lilac margins; and small bluish tufts surmount the bare orbits and post-ocular region. *Falcinellus speciosus* is black with rainbow-like reflexions; the broad plumes of the sides of the upper breast being banded with metallic blue and green, and having wide tips which open upwards into a fan; while the long pointed flank-feathers compose similarly coloured tufts. *Astrapia nigra*, the

[1] W. A. Forbes, *P.Z.S.* 1882, pp. 347-350; Beddard, *Ibis*, 1891, pp. 512-514.

[2] Not to be confounded with the New Zealand Rifleman (*Acanthidositta chloris.*)

"Paradise-Pie" of old authors, is bronzy-black above and green below, with golden-green occiput and nape, purplish black throat, coppery fore-neck, and violet tail, the feathers round the head forming an erectile frill. *A. stephaniae* has the head and neck bluer, the breast purplish-bronze. The smaller *A. splendidissima* has a more brilliant nape-region, red fore-neck, and much buff on the tail. *Macgregoria pulchra* is black, with mainly orange-buff primaries, and an orange wattle covering most of the face. *Paradigalla carunculata* is black, with green and bronzy sheen above; the front of the head being naked, with three wattles on each side—one broad and yellow above the bill, another moderate and blue at the gape, a third small and red below it. *Paradisea apoda*, the Great Bird of Paradise, is rich brown, becoming purplish beneath; the head and neck are pale yellow, the forehead, lores, cheeks, and throat metallic green. The wiry median rectrices have very slight apical and basal webs, while long, thick, extensile tufts of delicate decomposed golden-orange feathers, tipped with brown, grace the sides. Of its congeners, *P. minor* has the mantle straw-coloured; *P. raggiana* has a light yellow gorget, and red lateral plumes like those of *P.* (*Uranornis*) *rubra*, the Red Bird of Paradise. *P.* (*Paradisornis*) *rudolphi* is greenish-blue and dusky above, with blackish head, neck, and under surface, and a purplish occipital patch. From the sides of the body spring two series of elongated, decomposed feathers; the outer and stiffer being ultramarine, changing terminally to lilac with a brown external tinge, the inner smaller and deeper blue. Below these come a row of short chestnut plumes and finally a set of black. The two long median rectrices are violet-black with small blue

Fig. 125.—Long-tailed Bird of Paradise. *Falcinellus speciosus.* ×$\frac{1}{7}$. (From *Malay Archipelago.*)

racquet-tips. *Cicinnurus regius*, the King Bird of Paradise, hardly seven inches long, is glossy crimson, with a metallic green band dividing the throat from the white lower parts. An expansible "fan" of ashy plumes tipped with emerald arises from each side, while the long median tail-wires have the terminal green inner webs coiled into discs. The feathering reaches far down the orange bill; the feet are cobalt, contrasting with the black, yellowish, or fleshy tints usual in the Family. *Diphyllodes gulielmi tertii* is orange-red with mainly dusky wings and tail; the long nuchal ruff being orange, the lateral neck-tufts purplish-brown, the pectoral shield green edged with emerald,

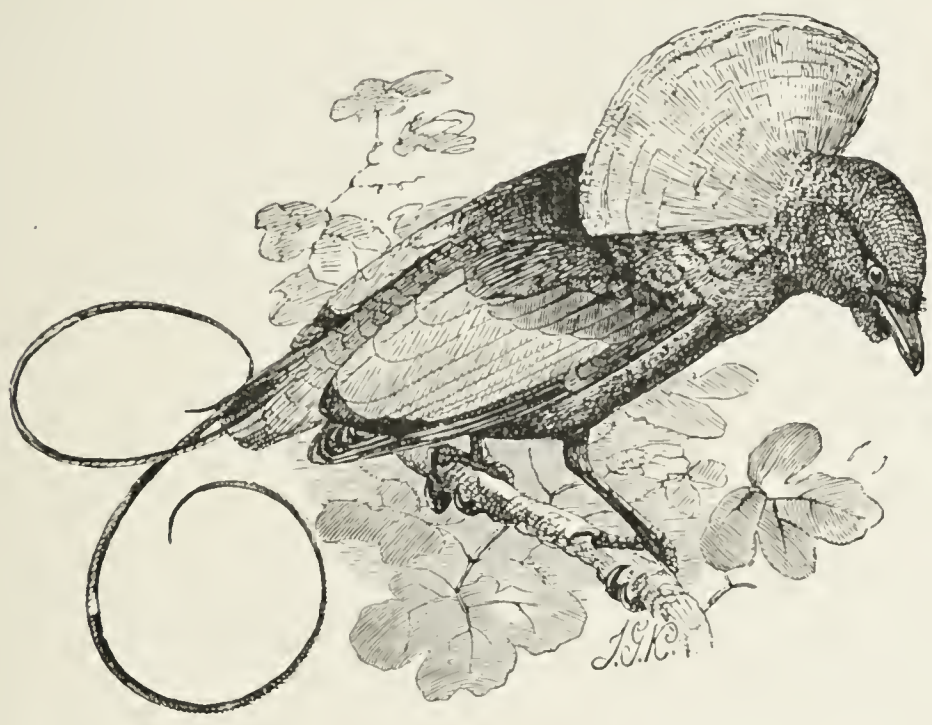

FIG. 126.—Magnificent Bird of Paradise. *Diphyllodes magnifica*. $\times \frac{3}{7}$.
(From *Malay Archipelago*.)

the long side-plumes brown with green ends, the belly purple. *D. magnifica* has a brown head and under surface, green throat and breast-shield, orange-brown back surmounted by a double cape of straw-yellow upon red-brown, and long, curved steel-blue tail-wires. *Schlegelia respublica* is remarkable for its naked blue head, with two lines of brown feathers crossing each other at right angles, and for its blue feet. The upper parts are successively green, yellow, crimson, black, and brown; the silky gular shield is green, with metallic blue spots above and coppery marks below; the lateral breast-plumes shew coppery and green hues. *Parotia sexpennis*, the Six-wired Bird of Paradise, is bronzy- and purplish-black, having scale-like golden throat- and breast-feathers with green and blue reflexions. A satiny white

patch crosses the forehead; the occiput is green, blue, and purple, having two lateral tufts, from each of which spring three wires terminating in small black discs; while large, soft, erectile masses of black adorn each side of the body. *Semioptera wallacii*, the Standard-wing, is mouse-coloured, with somewhat bronzy back and violet head; the pectoral feathers have green edges; the green shield on the fore-neck extends in lateral tufts to the flanks; and two long, narrow white plumes, erected at will, adorn the bend of each wing. *Lophorhina superba* is black, with blue, green, and bronzy gloss on the head and neck; the bluish-green breast-shield is prolonged at the sides, and a metallic black erectile ruff graces the nape. *Lamprothorax* has coppery, green, purple, rosy, and brownish hues, and two long blue-green median rectrices. *Phonygammus jamesi* is purplish-violet, with blue-green head, under surface, lanceolate neck-feathers, and acuminate occipital tufts. The extraordinary *Pteridophora alberti* possesses a wonderful streamer behind each eye, twice as long as the body. This has, on the outer side only, about thirty-seven thin quadrangular enamel-like lobes, which are light blue with dusky backs. The plumage is black, with olive rump-region and ochraceous lower parts, the head and neck shewing elongated plumes.

Fig. 127.—Six-wired Bird of Paradise. *Parotia sexpennis.* $\times\frac{1}{5}$. (From *Malay Archipelago.*)

Manucodia atra is steel-green and black, with purple reflexions; *M.* (*Eucorax*) *comrii* has the head and neck-feathers curly, *M. chalybeata* those of the fore-neck. The Crow-like *Lycocorax pyrrhopterus* is greenish-black with brown wings; *Xanthomelus aureus* is orange-yellow, and has a deeper-coloured crested head and neck, black throat, tail, and part of wings and back, and a cape of hackled plumes falling over the last.

Of the Bower-birds, *Prionodura newtoniana* is bright orange, olive, and brown; *Cnemophilus macgregori* is golden-yellow above and black below, with brownish wings and tail; the thin recurved

crest merging into a compressed frontal ridge, whence chestnut feathering extends over the culmen. *Loria loriae* is chiefly purplish-black with an iridescent violet nasal shield of scale-like feathers. *Loboparadisea sericea* is rufous-brown and yellow, with a wattle, apparently bluish, extending upwards from the gape on each side. *Amblyornis inornata* and *A. subalaris* are respectively olive and reddish-brown, with a huge orange-red crest. *A. flavifrons* has the crest yellower. *Sericulus melinus*, the Regent-bird, is black, with orange head, neck, and most of the remiges; *Ptilo-*

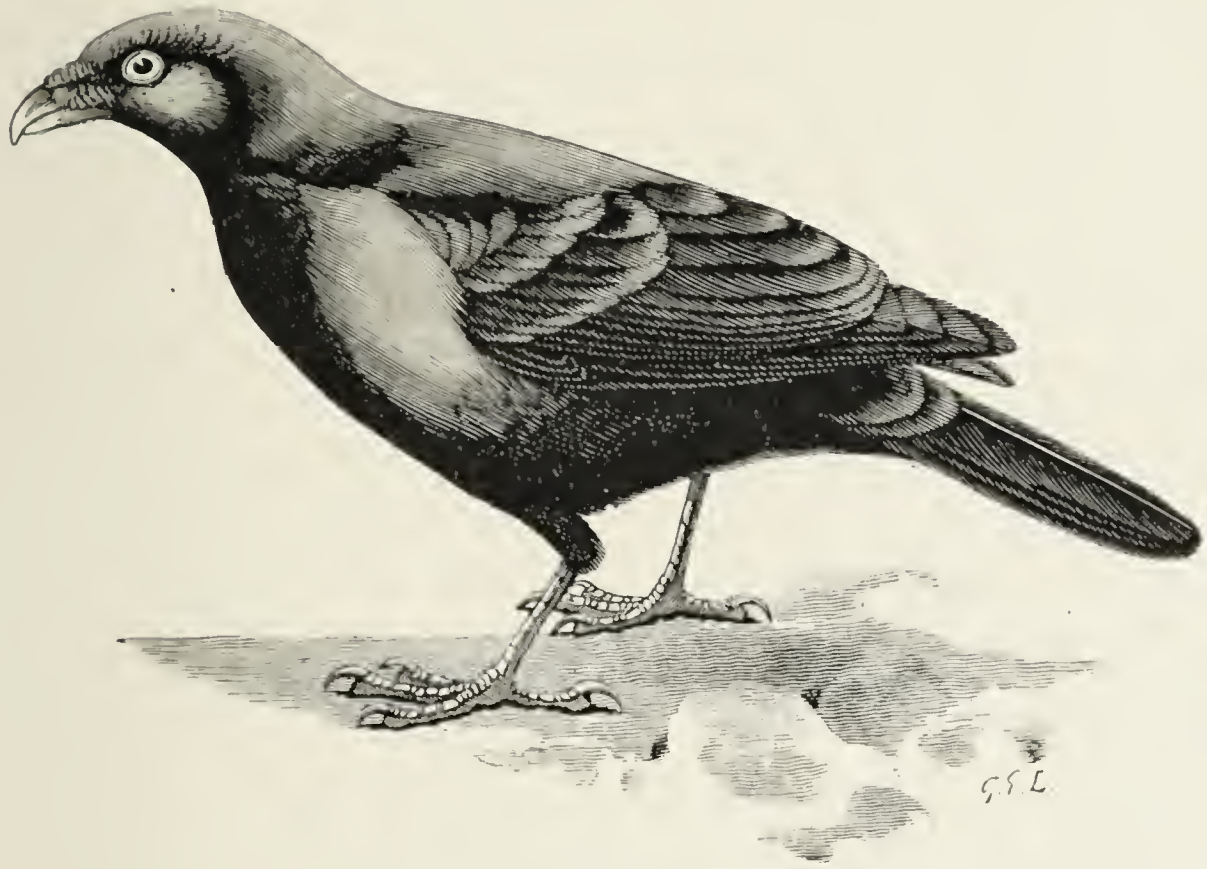

Fig. 128.—Satin Bower-bird. *Ptilorhynchus violaceus*. × $\frac{1}{3}$.

rhynchus violaceus, the Satin-bird, is purplish-black, with much feathered culmen; *Scenopoeetes dentirostris* is olive-brown above, and fulvous with dusky streaks below. *Aeluredus viridis*, the Cat-bird, not to be confounded with that of America (p. 519), is bright green, with a blue wash on the back, and with white streaks, bars, or spots on the nape, wings, tail, and yellowish under parts. Other species of the genus have mainly black or brown heads, while some have white throats with black markings. *Chlamydodera nuchalis* has grey-brown plumage above with whitish tips, a lilac nuchal band backed by stiff feathers, and a yellow-grey lower surface.

Female Paradise-birds generally have brown upper parts with lighter markings, though they are occasionally blacker, as in *Astrapia*

and *Paradigalla;* below the colour is rufous, buff, grey, yellowish or white, with bars, stripes, or chevrons of blackish or brown. In the female of *Schlegelia* the bare head is duller than in the male, while a little red and gold shews above; the hen of *Ptilorhynchus* exhibits grey-green and brown tints; the sexes are almost alike in *Phonygammus, Manucodia, Lycocorax,* and *Aeluredus;* in *Paradisornis* the female has blue wings and tail. Young birds usually resemble their mother; but with regard to their progress to maturity, the elongation and abrasion of the webs of the median rectrices, and the growth of the decorative tufts, the works of Mr. Wallace,[1] Dr. Guillemard,[2] and Mr. Rothschild[3] should be consulted.

Except in the Bower-birds the habits vary but little. Paradise-birds are lively and active, shy though curious, taking refuge in the thick foliage when disturbed; small flocks are not unfrequently observed, usually of one species, while for considerable periods the males appear to live apart. Closely wooded hills and ravines are the chief resorts, *Falcinellus, Astrapia, Lophorhina, Diphyllodes,* and the like preferring the inland heights of New Guinea up to an altitude of about nine thousand feet; *Parotia* of that country and *Scenopoeetes* of Queensland range to about four thousand feet; but such forms as *Cicinnurus, Xanthomelus, Phonygammus, Ptilorhis,* and the Australian Cat-birds and Bower-birds, occupy lower elevations on the coast or elsewhere. *Falcinellus, Astrapia, Paradisea, Parotia, Ptilorhis, Scriculus,* and doubtless others, love high tree-tops; *Semioptera, Cicinnurus,* and so forth, live nearer to the ground. The brief flight is rapid, though undulating and often heavy; in *Cicinnurus* it is noisy, in *Ptilorhis* the sound produced resembles the rustling of silk. Most species hop constantly about the boughs; *Paradigalla* often rests on dead trees; *Drepanornis, Selcucides, Semioptera,* and *Ptilorhis,* search under the bark for insects, and move about like Creepers. The pugnacious males of *Paradisea* collect to "dance" on favourite trees at the breeding season, when they fly about with elevated and vibrating plumes; while in the Family generally the cock courts the hen in Pigeon-like fashion, *Diphyllodes* making meanwhile a complete circle of its expanded mantle- and throat-plumes. *Parotia* scratches and rolls in the dust like a Fowl.

The voice may be a shrill reiterated "wake-wake," as in *Paradisea;* a harsh or sonorous cry, as in *Falcinellus, Chlamydodera,*

[1] *Malay Archipelago,* ch. xxxviii. [2] *P.Z.S.* 1885, pp. 651-656. [3] *Das Tier-reich,* 1898.

Phonygammus, Ptilorhynchus, Sericulus, Seleucides, and *Semioptera ;* a long, grating or triple sound, as in *Ptilorhis ;* a mewing or flute-like note, as in *Cicinnurus ;* or a sharp whistle, as in *Aeluredus ;* the last-named and *Amblyornis* being especially excellent mimics. The diet consists largely of berries, seeds, fruits of *Pandanus,* and *Freycinetia,* the fig, nutmeg, and so forth ; frogs, lizards, worms, snails, and caterpillars, however, are also eaten ; insects are in great request ; and *Seleucides* sucks honey from the flowers. The nest and eggs of several species have now been discovered ; the former being a loose, open fabric of sticks and leaves in *Ptilorhis, Ptilorhynchus, Sericulus,* and *Phonygammus ;* or of twigs, roots, moss, and grass in *Eucorax, Chlamydodera, Prionodura, Aeluredus,* and *Drepanornis ;* it is placed in bushes, if not in low or even high trees. The eggs are glossy reddish-buff, with dark rufous or chestnut blotches and streaks, and a few black spots, in *Paradisea apoda, P. augustae victoriae, P. raggiana,* and *Ptilorhis victoriae ;* similar or whiter, often with purplish or purplish-grey markings in *Eucorax, Manucodia,* and *Drepanornis cervinicauda ;* yellower with additional wavy scrolling in *Ptilorhynchus violaceus ;* yellowish-grey with pale brown freckles and blotches in *Prionodura newtoniana ;* bluish or greenish-white, with or without red-brown dots and lines, in *Aeluredus maculosus* and *Ae. viridis ;* greenish-white with a network of narrow brown and black lines in *Chlamydodera maculata* and *C. cerviniventris ;* pale lavender with sienna and lilac spots and scrawls in *Sericulus melinus.* The number of eggs found varies from one to three.

Parotia lawesi, Aeluredus viridis and *Scenopoectes dentirostris,* though not said to form bowers, make clear spaces where from six to eight males meet to sport, the last two species decorating them with green or coloured leaves, berries, and flowers. *Prionodura* fashions a bower or play-place of from four to six feet high by eight broad, piling sticks round two trees and roofing over the intervening space with creepers ; white moss, ferns, and green fruit serving as ornaments. Small structures of over-arching grass capped with twigs are often observable close by. *Amblyornis inornata* heaps a cone of moss round a sapling, leaving a circular gallery between this and an outer conical cover of sticks two feet high, covered with orchid sprays. Before the entrance lies a bed of green moss decked with bright flowers and berries, which are renewed daily, the withered decorations being piled at

the back. *A. subalaris* fashions a domed bower of sticks and moss, with one or two openings, round a shrub which is itself entwined with twigs; the centre of the floor shewing a cheese-like mass of moss ornamented with flowers and seeds. *Scriculus melinus* builds a run about a foot long on a platform of sticks, composing it of arched twigs and decorating it with shells, berries, and leaves. *Ptilorhynchus violaceus* makes a like structure of twigs and grass, which scarcely meet above, and adorns it with bright feathers; scattering other feathers, bones, shells, rags, berries, and the like over the space which Bower-birds habitually clear in front. In *Chlamydodera nuchalis* the similar bower, about three feet long, is lined with grasses, a large heap of ornaments lying before each entrance.

Paradise-birds are shot with blunt arrows, snared, caught in nets, in cloths, or with bird-lime; they have been kept in captivity by the Zoological Society of London, and in Italy.

Fam. XXIII. **Corvidae.**—The Crows and their kin compose a fairly uniform tribe, often divided into the Sub-families *Corvinae* (Crows), *Garrulinae* (Magpies and Jays), and *Fregilinae* (Choughs).

The bill is generally stout and fairly straight, with no distinct notch, being very strong in *Corvultur* and *Corvus corax*, but more or less curved in *Gazzola*, *Microcorax*, *Macrocorax*, *Urocissa*, *Garrulus*, *Callaeas* (*Glaucopis*), *Struthidea*, and *Pyrrhocorax*; while in the last-named and *Hetcrocorax* it is exceptionally long and slender, and in *Nucifraga* subulate and of diverse proportions. The metatarsus is usually strong; the wings are long and pointed in Crows and Choughs, shorter in Jays and Magpies, and decidedly rounded in *Corcorax*, *Callaeas*, and *Struthidea*. The variable tail is very long and much graduated in *Pica*, *Cyanopica*, *Urocissa*, *Cryptorhina*, *Dendrocitta*, *Crypsirhina*, *Cissa*, and *Calocitta*, the two median rectrices often exceeding the others; but it is usually moderate, though at the same time graduated in some Jays.

Crests occur in *Cyanocitta*, *Platysmurus*, *Cyanocorax*, *Urolcuca*, and *Calocitta*, those of the last two being recurved, and *Calocitta* having the plumes widened; sometimes the crown-feathers are dense and erectile, as in *Garrulus*. The head of *Picathartes* is bare and yellow, with a broad black patch behind each eye; *Gymnocorax* shews a large yellowish or whitish naked space on the face; the adult Rook (*Corvus frugilegus*) has whitish skin over the forehead, lores, and throat; in *C. pastinator* the throat is feathered. *Pica mauritanica* has a blue, and the yellow-billed

P. nuttalli a yellow, ear-patch ; *Cissa* a fleshy vermilion orbital outgrowth ; *Callaeas* an orange rictal wattle with blue base in one species, a blue wattle in the other.

This Family occupies nearly all the globe, except the Australian Region east of the Sandwich Islands, New Caledonia, and New Zealand ; while the members are less plentiful in America, and from Panama to Uruguay only a few genera akin to the Jay occur. The sexes are similar, the young usually duller.

True Crows are generally black with a purplish or greenish gloss, and frequently with white at the base of the feathers ; some, however, are browner, while the silvery-grey hind-neck of the Jackdaw and the grey back and lower parts of the "Hooded" Crow are well known. The Chinese *Corvus torquatus* and the Ethiopian *C. scapulatus* have white collars behind, and white on the breast ; in *Gazzola* of Celebes that colour extends further ; but the African *Corvultur* has the white collar only. The throat sometimes exhibits hackles, and in the Antillean *Microcorax leucognaphalus* the feathers have hair-like extremities. Our visitor the Nutcracker (*Nucifraga caryocatactes*) is brown, with whitish dorsal and pectoral spots, and blackish quills ; three or four other species of the genus, with most variable bills, inhabit conifer woods in the Palaearctic Region ; and a near ally (*Picicorvus columbianus*) those of the western Rocky Mountains. Choughs (*Pyrrhocorax*), which occur in the Palaearctic and the extreme north of the Ethiopian Region, are glossy black, with brilliant red feet, and red or yellow bill.

Pica rustica, the well-known Magpie, needs no description, nor do its black and white congeners, *P. mauritanica*, distinguished by a naked blue spot behind the eye, and *P. nuttalli* with this spot and the beak yellow. *P. rustica* extends through the Palaearctic Region, and reaches Formosa and North America ; the other species are found respectively in Algeria and Morocco and in California. *Platysmurus aterrimus* of Borneo, and *Temnurus truncatus* of Cochin China are instances of uniform glossy black forms in this section : *Psilorhinus*, from the centre of America, is a dull brown Jay. *Cyanopica cooki*, of Southern Spain, represented in Eastern Asia and Japan by *C. cyana*, is a blue Magpie, having cobalt wings and tail, an ashy body, and a black head ; while the Indo-Chinese and Sumatran genus, *Dendrocitta*, shews brown, orange, buff, and grey tints, mingled with black and usually white. *Cissa* contains three species from India, Burma,

Sumatra, and Java, of lovely green and blue, or cobalt and ultramarine hues, with some red-brown on the wing, a white tip to the tail, coral-red bill and feet, and—in two cases—a black nape. Our soft-plumaged Jay (*Garrulus glandarius*), with its black and white crest and wings, black tail, reddish-fawn upper and buff under parts, and patch of blue, white and black bars on the wing-coverts, may represent a genus ranging over the Palaearctic Region, and through the Himalayas, to the Burmese districts and Formosa. In Japan alone four species are found. *Aphelocoma* and *Calocitta* of the central parts of the New World; the Blue Jays (*Cyanocitta*) of North America; *Urocissa*, a Magpie with red or yellow bill and feet, from India, Burma, and China; and the Central and South American *Cyanocorax*, all shew more blue than *Garrulus*, not uncommonly on the under surface. *Perisoreus infaustus*, the Siberian Jay, is brown, grey, and olive, with much chestnut on the wings, tail, and abdomen, its congeners being plain brown, grey, and white. Lastly, *Xanthura luxuosa*, the Green Jay of South Texas and Mexico, is green, with yellow on the abdomen and lateral rectrices, and a black and blue head; some species of the genus, which reaches southwards to Venezuela and Bolivia, having the lower surface entirely yellow or black, and others being almost blue with black on the head.

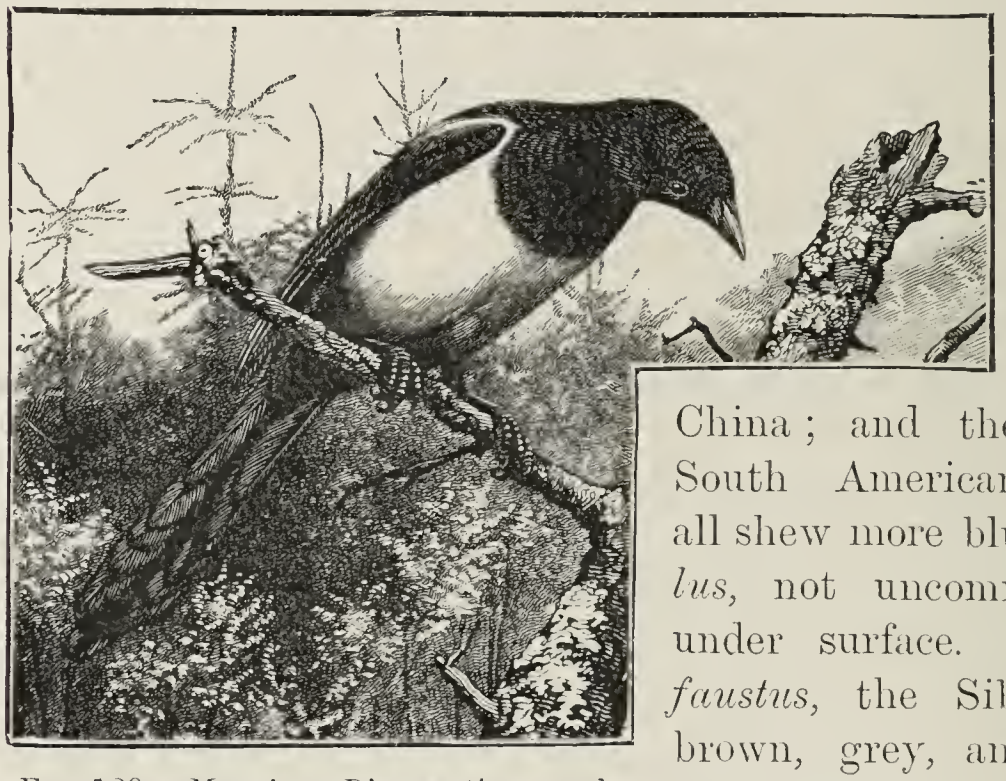

FIG. 129.—Magpie. *Pica rustica*. $\times \frac{1}{6}$.
(From *Poachers*.)

The habits of the cunning voracious Crows, the gregarious Rooks, the astute but bold Magpies and Jackdaws, and the more shy or retiring Jays and Choughs are well known; yet the habit of posting sentinels in the Rook, the tumbling in mid-air of that bird, the Raven, and the Jackdaw, the scolding pursuit of intruders by Magpies and Jays, and the breaking of clams, bones, and the like by dropping them from aloft, by the Raven, Carrion-Crow,

and *Corvus caurinus* require passing mention. Crows generally inhabit wooded country, but also bare moorlands or sea-coasts; the Nutcracker requires pine-forests—commonly at considerable elevations; and Magpies haunt woods, yet not so invariably as Jays. The whole Family hop, and most forms, except perhaps Jays, walk or run also. All are active birds and fly well, the Chough, Jay, and Nutcracker in more undulating fashion:

FIG. 130.—Raven. *Corvus corax.* × $\frac{1}{17}$.

while soaring is a common practice. Ravens have very deep voices, and croak, "bark," or "grunt"; Jackdaws utter a clear "jake-jake"; Choughs a ringing, metallic note or a hoarse "chough-chough"; Nutcrackers a "churr-churr"; Magpies a continuous "rattle" or "chatter." Jays vary their harsh, grating utterances by mimicking other species, the American Blue Jays being notorious adepts, and exhibiting meanwhile fantastic contortions of the head, wings, and tail. Many species, such as Ravens, Magpies, and Jackdaws, learn to imitate sounds when tamed. The Corvidae

are almost omnivorous, Ravens and other strong species even attacking weakly ewes or lambs, and preying on small mammals, birds, and reptiles; Hooded and Carrion Crows, Rooks, Magpies, Jackdaws, and Jays suck eggs; while Rooks, though undoubtedly beneficial, also grub up seed-corn and potatoes. An immense amount of insect-life is, however, destroyed, and the larger forms dispose of carrion; the American *Corvus ossifragus* and *C. corone,* moreover, will catch living fish. Magpies and Jays feed largely upon the ground, and eat slugs, snails, worms, insects, nuts, acorns, grain, seeds of conifers, and other fruits; Nutcrackers devour quantities of the last; *Corvus tropicus, Macrocorax,* and *Gymnocorax* relish fruit. Jays store provisions, and Jackdaws pick insects off cattle. The nests of Crows and Nutcrackers are bulky structures of sticks, lined with soft materials; the rough domed fabric of the Magpie is neatly lined with roots upon a layer of clay; the slighter nests of Choughs and Jays are inlaid with roots and fibres—more rarely with moss, hair, or wool—and every variety is found between these limits. The larger species build in forks and holes in trees, in crevices of rocks and masonry, or rarely in or on the ground; the Chough never chooses trees; Jays nest comparatively low, and often in bushes. Crows' eggs are normally greenish, mottled with darker green, olive, or brownish, but *Heterocorax capensis* has them pinkish with red spots, while other Crows, Ravens, and *Dendrocitta* sometimes shew a similar tint. Jackdaws' eggs are bluish-green or white, with dark olive or black markings interspersed with grey; those of Magpies and Nutcrackers have a like ground-colour with greenish-olive and faint brownish spots respectively; those of Jays are greenish, or even bluish, with close olive-green frecklings or zones, and occasional black scrawls at the larger end; those of Choughs are yellowish-white, with light brown and grey markings. The number laid varies from two or three, to as many as nine in Magpies, but is usually four or five. The hens sit rather closely. Ravens sometimes will even attack man at the nest.

Of genera doubtfully included in the Family, *Picathartes* of the Gold Coast is slaty-grey, with brown quills, white under parts, and bare yellow head, shewing black behind each eye; it builds among rocks near forest-streams, and feeds upon reptiles and molluscs. The egg is whitish, clouded and dotted with brown. *Callaeas (Glaucopis) cinerea,* which is blue-grey, with black on the

head, and an orange and blue rictal wattle, and its congener *C. wilsoni*, with entirely blue wattle, inhabit the lower hill-forests of the South and North Islands of New Zealand respectively. They have deep, rich, long-drawn notes, diversified by "cackles," "mews," or "bell-like" sounds, the male performing antics when courting. The food consists of fruit, flowers, and insects; the

FIG. 131.—Huia. *Heteralocha acutirostris.* $\times \frac{1}{3}$. (From *Nature*.)

flight is feeble. The large nests of twigs, moss, and grass are placed in trees; the two or three eggs being purplish-grey with brown blotches or frecklings. *Corcorax* and *Struthidea* are peculiar to Australia, the former being glossy black with white on the wing, the latter brownish-grey with black tail.[1] *Corcorax* haunts open forests, brook-sides, and lagoons in little flocks, running about actively, or leaping upon the boughs with motile, outspread tail. The food consists of insects; the note is grating or mournful; while

[1] The *Austro-coraces* (p. 531) may contain these three genera and the Paradiseidae.

the male courts the female like a Pigeon. The nest, a sort of basin of mud with a straw lining, is fixed on a horizontal branch, and contains from four to seven yellowish-white eggs with olive and purplish-brown markings. *Struthidea* frequents pine tracts, and has similar habits and nest, the eggs being white with red-brown and grey blotches. In *Heteralocha*[1] *acutirostris*, the New Zealand Huia, the female has a remarkably long, curved bill, that of the male being short, stout, and nearly straight. The plumage is greenish-black, with a white-tipped tail; the bill is whitish, the feet are blue-grey, the large rictal wattles orange. This bird frequents wooded gullies in the North Island, seldom flying above the foliage, but bounding or hopping along the ground or upon the branches. Natives attract and noose it by imitating the whistling note. The cock chisels away the decayed bark, and the hen probes the crevices for insects; "huhu" caterpillars and berries varying the main diet. The nest, of dry grass, leaves, and stalks, is placed in hollow trees, the eggs being apparently whitish, with or without brown and grey spots. *Creadion carunculatus*, the Saddle-back of the same country, is black, with chestnut back, rump, wing- and tail-coverts, and small yellow or red gape-wattles. It haunts wooded hills, hopping actively or moving spirally up the trunks and branches, while the flight is short, rapid, and laboured. The notes may be soft and sweet, or noisy and shrill; the food resembles that of *Heteraloeha*. The nest of dry leaves, ferns, fibres, moss, and bark is built in hollow trees or large ferns, the three or four greyish-white eggs shewing purplish-brown markings.

Podoces includes four desert species, with elongated, strong, curved, and pointed bills; long, stout legs; short, rounded wings; and moderate square tails. The colour is fawn, grey, and brown, generally with black and white wings and black tail; *P. hendersoni* and *P. biddulphi* have a black cap, the former shewing white spots on it, *P. panderi* has a black throat-patch, *P. humilis* is brown with whitish nape and lower parts. They haunt sand-hills covered with saxaul (*Anabasis ammodendron*) or tamarisk, from Transcaspia to Tibet, running swiftly, occasionally flying like a Jay, feeding on the ground upon insects, their larvae, and seeds, uttering harsh reiterated Woodpecker-like cries, and making a nest of twigs lined with bark, grass, and hair in low trees, bushes, or rarely holes in the ground. The four eggs are greenish-grey

[1] This genus and the two next perhaps belong to the Sturnidae.

with olive spots. *P. humilis* frequents more grassy ground up to eleven thousand feet.

Fam. XXIV. **Sturnidae.**—The Starlings, apparently connecting the *Corvidae* and the *Icteridae*, are divided by Mr. Oates [1] and Dr. Sharpe [2] into *Eulabetidae* (Tree-Starlings) with rictal bristles, more arboreal habits, and usually spotted eggs, and *Sturnidae* (Starlings proper) where the contrary holds good.[3] To these *Buphaga* may be added for the present, in default of a better position.

The bill is generally long and pointed—especially in *Sturnopastor*,—but is exceptionally slender in *Cinnamopterus*, shorter and stouter in *Basilornis, Buphaga, Pastor, Pholidauges*, and *Aplonis*; being curved in the last three, and also in *Fregilupus* and *Necropsar*; where it is longer. The anteriorly scutellated metatarsus is ordinarily strong, and is shortest in the Tree-Starlings. The wing is usually moderate, with small first primary, though it is more elongated and pointed in *Sturnus* and *Dilophus*, rounded in *Sturnopastor, Temenuchus*, and so forth, short in *Coccycolius* and *Buphaga*; the secondaries have long filamentous basal appendages in *Psaroglossa*, and loose hair-like exterior webs in *Onychognathus*. The tail varies from short to long, from square to much graduated; it is forked in *Sturnia*, and may have acuminate feathers; while *Macruropsar* and *Lamprotornis* possess exceptionally developed rectrices, *L. caudatus* having the broad median pair longer than the body. Lanceolate feathers commonly adorn the neck and breast; bushy crests occur in *Pastor* and *Temenuchus*, smaller tufts in *Sturnia, Basilornis, Enodes, Fregilupus, Graculipica, Sturnornis* and *Acridotheres cristatellus*; recurved plumes may cover the nostrils, as in *Acridotheres, Ampeliceps*, and *Basilornis*; while bare chins, orbits, or ear-patches of brown, yellow, and the like are frequent. *Charitornis* has the throat and cheeks naked; *Dilophus* the head and throat bare, with two erect wattles above and one below; *Sarcops* dull-red naked orbits, and merely a narrow feathered line down the crown; *Eulabes* a yellow postocular lappet forking to the back of the eye and the eyebrow, and a yellow patch below; *Enodes* a broad, superciliary wax-like red line; and *Scissirostrum* similar crimson feathers on the rump.

[1] *Nests and Eggs of Indian Birds*, i. 1889. p. 363.

[2] *A Review of Recent Attempts to Classify Birds*, 1891 (2nd *Internat. Orn. Congress*).

[3] For *Paramythia montium*, of New Guinea, a dull-blue bird with creamy head, black crest and fore-neck, olive-green rump-region, yellow vent, and brownish wings; cf. Sclater, *Ibis*, 1893, pp. 243-245; Hartert, *Novitat. Zool.* iii. pp. 13, 14.

Most of the brighter species exhibit purple, coppery, blue and green reflexions, our familiar Starling (*Sturnus vulgaris*) being iridescent black, with buff marks above, and, after the autumn moult, white spots below. The female is duller, but in this Family the sexes usually differ little. *S. unicolor* is unspotted. *Spodiopsar burmanicus* has grey upper and pinkish under parts, with brownish wings and tail, white head, and white-tipped rectrices; *Sturnopastor contra* is blackish-brown and white above, and greyish beneath, with green-black head and throat and white cheeks; *Pastor roseus*, which wanders to Britain, is glossy black, with pink back and abdomen; *Graculipica melanoptera* is almost pure white, with black or bronzy remiges and rectrices. *Eulabes religiosa*, the Myna,—a name also popularly applied to *Acridotheres* (sacred to the god Ram Deo) and several other Indian forms,—is black, with purple and green reflexions, and a white patch on the wing-quills; *Cinnamopterus tenuirostris* is more highly coloured, with mainly chestnut primaries; *Melanopyrrhus orientalis* adds to its metallic black hue an orange head, neck, rump, and breast; *Lamprotornis* and the shorter-tailed *Lamprocolius* exhibit lovely greens, purples, and peacock-blues, relieved by golden-bronze; *Coccycolius* is golden-green with purple cheeks and abdomen. *Pholidauges leucogaster* is rich purplish-violet with white belly,

FIG. 132.—Starling. *Sturnus vulgaris*. × ½.
(From *English Illustrated Magazine*.)

the female being brown and buff above, and whitish below with dusky striations; *Calornis* and *Aplonis* are usually dullish green; while the extinct *Fregilupus varius* was ashy-brown, grey, and white. *Fulculia* is white with blue-black back, wings, and tail. It frequents trees or streams, and utters plaintive, melodious notes. *Buphaga* is dull-brown, with fulvous rump and lower surface. The bill is commonly black throughout the group, but is sometimes red, pinkish, bluish, greenish, orange, or yellow: the feet also vary in colour. Albinos are rather frequent.

This Family occupies almost all the Old World, but not America proper, though *Sturnus vulgaris* has strayed to Greenland: the headquarters lie in the Indian and Ethiopian Regions, wherein several forms have a very restricted distribution. Instances of this are *Charitornis* of the Sula Islands, *Scissirostrum*, *Enodes*, and *Streptocitta* of Celebes, *Hagiopsar* of the Dead Sea and Sinaitic districts, *Hartlaubius* and *Fulcidia* of Madagascar, *Sarcops* of the Philippines, *Mino* of Papuasia, *Melanopyrrhus* and *Macropsar* of New Guinea and its islands, *Aplonis* of the Pacific and the Tenimber group. *Fregilupus*, of which only a few examples exist in collections, was confined to Réunion, *Necropsar* is an extinct form from Rodriguez. *Calornis* alone inhabits Australia.

Lamprotornis, *Spodiopsar*, and the Eulabetidae in general, rarely leave the trees they haunt; on the other hand, some forms, as our Starling, spend much time upon the ground, or roost in huge flocks on shrubs, reeds, and the like. The habits are wary, and seldom as sociable as those of our British species, hills being often preferred to more wooded districts or the neighbourhood of houses. *Aethiopsar* reaches an altitude of seven thousand feet. The flight is strong, straight, and rapid, though heavier in *Buphaga*; while flocks of Starlings turn, sweep along, and gyrate in remarkable fashion, and soaring is not uncommon. The more terrestrial forms walk and run excellently, often stopping suddenly to probe the soil for worms or larvae, which, with insects generally, and molluscs, provide the chief sustenance. A large amount of fruit is also consumed, including berries and seeds; frogs and, as some say, callow nestlings are also devoured; *Pastor*, *Dilophus*, and *Acridotheres* destroy locusts; *Eulabes* and its allies prefer vegetable food; *Buphaga* is termed Ox-pecker or Rhinoceros-bird, from clearing ticks off those animals. Certain species disgorge nutriment for their young. The voice is commonly varied and pleasing, becoming

a rich song in *Eulabes;* but most forms whistle, chatter, or utter harsh sounds; and many are extraordinary mimics, or even talk, like the Starling and the Myna, under tuition. By the more typical forms a rough nest of straw, twigs, rags, wool, or feathers is placed in holes in trees, walls, or banks; under eaves; in burrows or stone-heaps: from four to seven uniform light blue or whitish eggs being deposited. *Sturnopastor,* alone or in societies, affixes a huge structure to the outer branches of trees or bushes; *Dilophus* makes a neater cup in similar situations; *Calornis,* which usually forms colonies, suspends from the boughs a bulky bottle-shaped structure with a side-entrance, and so forth. Even our Starling at times builds an open nest. The Eulabetidae generally lay spotted eggs, *Dilophus* occasionally; *Calornis* has them greenish with reddish-brown marks.

Fam. XXV. **Drepanididae.**—According to the latest views, namely those of Dr. Gadow,[1] this group contains only the curious forms below, which are all peculiar to the Sandwich Islands. In most of them the semi-tubular tongue is dorsally frayed out into a single brush, but in several thick-billed species it is but slightly tubular, and is split or frayed. The non-serrated beak varies greatly, being elongated and arched in *Vestiaria;* very long and curved with projecting maxilla in *Drepanis* and *Hemignathus;* and similar, but with the upcurved or straight mandible only about half as long as the maxilla in *Heterorhynchus.* In *Himatione, Oreomyza, Loxops, Palmeria, Ciridops,* and *Chrysomitridops* it is much shorter and little decurved; in *Psittacirostra, Loxioïdes, Chloridops,* and *Rhodacanthis* it is stout, Finch-like, and hooked, being enormously developed in the last two; in the extraordinary *Pseudonestor* it is Parrot-like. In *Loxops* the mandible is twisted indifferently to either side, possibly by constant use. Over the nostrils an operculum is often present; but bristles of all kinds are absent. The scutes of the moderate metatarsus shew a tendency to fusion; the wings are of medium length, with a hardly visible outer primary. The tail is rather short and nearly square, having pointed rectrices in *Vestiaria* and *Drepanis;* and exhibits a tendency to forking. Fluffy feathering constantly characterizes the back, flanks, or axillary region. There is a more or less

[1] Cf. Wilson and Evans, *Aves Hawaiienses,* pt. ii. 1891, pp. 17-21; pt. vii. 1899, pp. 1-7; and, for the Family generally, the same work, Rothschild, *Avifauna of Laysan,* and Perkins, *Ibis,* 1893, pp. 101-112.

decided crop, as in many Finches. In some species the females appear to have shorter bills.

Drepanis pacifica is black, with golden rump, upper and under tail-coverts, tibiae, and bend of wing, a little white shewing on the wings and tail; *D. funerea* is almost entirely black. *Vestiaria coccinea* is vermilion, with black remiges and rectrices, and some white on the wing-coverts; the bill and feet being red. *Hemignathus* and *Heterorhynchus* are greenish-olive above, with black lores, brownish remiges, and usually yellowish or creamy lower surface; but the head is occasionally yellow. *Palmeria dolii* has blackish plumage with scarlet or orange tips, a brilliant scarlet-orange nape, an orange space round the eye, similarly coloured tibiae, a grey throat, and a dirty white crest curving over the culmen. *Himatione* is generally yellow-green, with browner wings, yellow under parts, and sometimes black lores; the very closely allied *Orcomyza* may be duller or greyer, with buff and white below. *H. sanguinea* is crimson, with black and red wings, and black tail. *Loxops*, which in one species is dimorphic, is scarlet or orange, with brown on the remiges and rectrices; *Chrysomitridops* is yellowish-olive, with yellow crown and lower surface, black on the wings and tail, and bluish bill. *Psittacirostra* is greenish with yellow head; *Rhodacanthis* is reddish-orange with browner back, or in one case yellow head, while the female is green. *Ciridops* is red, with black throat, tail, and most of the wings, grey nape and cheeks; it approaches *Cyanospiza ciris* (p. 585) in colour.

Fig. 133.—Mamo. *Drepanis pacifica*. $\times \frac{1}{2}$. (After Wilson and Evans, *Aves Hawaiienses*.)

Hens are ordinarily duller (often brownish or green), except in *Vestiaria* and *Himatione sanguinea;* the young are greenish-yellow relieved by black in *Vestiaria*, brown and buff in *Palmeria* and *Himatione sanguinea*, and assume the red or orange gradually.

These forms now chiefly haunt high damp hill-forests, though *Vestiaria* still occurs near the coast; they fly comparatively little, but spend much of their time creeping quietly and rapidly over the trunks and branches of acacia, "ohia," "mamane," and other trees, where they hunt for insects below the bark or on the leaves. None habitually seek the ground. The long-billed species delight in probing the decayed wood, and insert their mandibles into the crevices in search of food, which consists partly of lepidopterous larvae and spiders. Fruit is largely eaten, pods being split to obtain seeds, and honey is sucked either for its own sake or for the insects it attracts. The stomach at times contains grit. Most forms have a sweet song, the call-note being a reiterated "tweet" or metallic chirp; *Rhodacanthis*, moreover, whistles. *Himatione virens* makes a nest of roots and decayed leaves in trees, *Loxops aurea* apparently does the same; the former lays whitish eggs freckled and streaked with purplish-brown, but little is known of the reproduction. The splendid feather-cloaks of the Hawaiian kings, the "leis" (wreaths), waist-bands, and mask-decorations, were of old chiefly composed of the plumage of the "Mamo" (*Drepanis pacifica*), and the Iiwi (*Vestiaria coccinea*); but when the former became scarce, the lighter yellow tufts (p. 565) of the O-o (*Acrulocercus*) were utilized to pay the feather tax, though the cloaks were still called "Mamo." *Himatione sanguinea* was also laid under contribution, as was in later times the domestic cock.

Fam. XXVI. **Meliphagidae.**—The Honey-eaters, seldom bigger than a Thrush, are remarkable for their extensile quadruple or multiple tongue, which is frayed out latero-dorsally. They occupy the Australian Region, from which *Ptilotis limbata* alone crosses "Wallace's line" (p. 16) to Bali, and often have very restricted ranges. Two Sub-families may be recognised, *Myzomelinae* and *Meliphaginae*. The thin curved bill is commonly long, with prominent culmen and wide base; *Melithreptes* and *Plectrorhynchus*, however, have it short, and the latter straight. The maxilla is nearly always notched and serrated, several species of *Philemon* exhibiting a basal protuberance. The metatarsi may be long, as in *Acrulocercus*, or abbreviated as in *Manorhina*, the short anterior toes being partially

connected; the wings are variable in length, *Melithreptes* possessing comparatively small secondaries, *Anthornis* an abruptly narrowed second primary. The tail also varies in size: it is much rounded in *Melidectes* and *Meliphaga*, square in *Acanthorhynchus*, emarginated in *Anthornis*, and particularly long and graduated with pointed rectrices in *Acrulocercus* and *Chaetoptila*—*A. nobilis* having the median pair produced and spirally twisted, *A. apicalis* the ends upturned. *Pogonornis* has strong rictal bristles.

The *Myzomelinae* are usually habited in scarlet and black, as in the Soldier-bird of Australia (*Myzomela sanguinolenta*), with or without white or yellowish below; some, however, are chiefly or entirely olive or greyish-brown, while the females generally differ from the males, and the former occasionally shew red when the latter do not. A second genus, *Acanthorhynchus*, or Cobbler's Awl, is brown, chestnut, buff, black, and white. In the *Meliphaginae* the sexes are commonly alike, and exhibit a mixture of brown, olive, yellow, black, white, grey, rufous, and buff; the under parts frequently, and the upper rarely, being streaked or spotted. Metallic hues are rare, but *Anthornis* has a purplish gloss on the head. *Leptornis*, *Entomyza*, *Philemon*, *Melitograis*, and *Pycnopygius* are instances of dusky or olive coloration with lighter lower surface; *Prosthemadera* and *Certhionyx leucomelas* are black and white; *Plectrorhynchus* is brown and white; *Meliphaga* is yellow and black, spotted and barred below. The Hawaiian *Acrulocercus* is black or brownish, with a little white on the wings or tail, and possesses yellow axillary tufts and under tail-coverts, save in *A. braccatus*, where the tufts are grey-buff, the tibiae are yellow, the throat is barred with white, and the lower parts are streaky. *A. bishopi* has yellow ear-tufts. Their close ally, *Chaetoptila*, of the same islands, is light brown and yellowish above, with white spots, and a black cheek-stripe; the under surface being white with brown streaks, and the rump and flanks ochreous. The neck- and breast-plumage is lanceolate and decomposed. Many species of *Ptilotis* have white or yellow ear-tufts; the male of *Pogonornis* possesses white erectile post-ocular feathers; that of *Prosthemadera* two gular patches of curled white filamentary plumes, which give it the name of Parson-bird, as well as pointed white feathers curving forward from the sides of the neck. In two members of *Meliornis* white fan-like shields spring from the cheeks; *Glycyphila albifrons* has a white circum-ocular ring; while many forms have peculiar cheek-

feathers, fluffy chests, rumps or sides, and lanceolate or bristly plumage on the neck, cheeks, or throat. Naked blue, green, scarlet, yellow, lilac, pink, or whitish areas on the head, and pendant rictal or facial wattles, are frequent, especially in *Meliphaga*, *Ptilotis*, *Entomyza*,

FIG. 134.—Warty-faced Honey-Eater. *Meliphaga phrygia*. ×½. (From *Nature*.)

Philemon, *Melidectes*, *Acanthochaera* (Wattle-bird) and *Melirrhophetes*. The bill and feet vary from black to red, yellow, blue, or green.

The habits are fairly uniform, though certain species are comparatively shy. Small flocks often gather together, the haunts being dense forests, or open wooded country whether inland or littoral; some forms prefer the tree-tops, others low bushes and shrubs. These active, pugnacious birds dart about in zigzag fashion, or take powerful undulating flights, the tail meanwhile being frequently thrown back or expanded; at times they hover, or fall from aloft with closed wings. Constantly seen hopping among the boughs, or climbing and hanging to the twigs, in search

of the insects which constitute so much of their diet, they occasionally feed upon the ground—especially in the case of *Ptilotis*; while *Meliornis* and *Entomophila* will dart after their prey like Flycatchers. Figs and bananas, with other fruits and buds, are also eaten; honey is sucked from the flowers of *Eucalyptus*, *Acacia*, *Epacris*, and the like, in considerable quantities, the insects it attracts being perhaps the chief object: and *Philemon* batters large insects upon the branches before swallowing them. The voice is commonly loud, rich, and shrill, but varies from a whistle or a pipe to a chirp: some species, however, are more quiet, others give vent to slow, plaintive cries, quickly reiterated notes, or comparatively harsh sounds. The Tui, or Parson-bird, utters a wild song, laughs, coughs, sneezes, and mimics generally; *Acrulocercus* gets the name of O-o from its harsh double call; *Pogonornis* that of Stitch-bird from its clicking cry, though it also whistles; while *Philemon corniculatus* is sometimes called "Four-o'clock," "Poor Soldier," or "Pimlico," from its note. *Anthornis*, the New Zealand "Bell-bird," usually heard in chorus, has a voice like the tinkling of a silver bell.[1] The nest, normally a slight structure of twigs, roots, bark, grass, and spiders' webs, lined with woolly materials, fur, or feathers, is placed in bushes, trees, or even tall grass, and generally has the rim woven over a supporting fork. A few species, however, including the New Zealand forms, *Pogonornis*, *Anthornis*, and *Prosthemadera*, build a solid fabric of twigs and rough materials

FIG. 135.—Tui. *Prosthemadera novae zealandiae*. $\times \frac{1}{3}$.

[1] *Orcoeca cristata* (Laniidae) and *Manorhina melanophrys* (Meliphagidae) are the Bell-birds of Australia; *Chasmorhynchus* (Cotingidae) of the Neotropical Region.

among the branches. The eggs, two, three, or rarely four in number, are buffish-white, salmon-coloured or, exceptionally, olive, with spots, freckles, zones, and occasionally lines, of red-brown, rufous, bright red, blackish and grey. Two or three broods are reared annually. *Entomyza cyanotis*, the Blue-eye, re-lines deserted birds' nests, or utilizes the top of that of *Pomatostomus*; *Glycyphila modesta* and *G. fasciata* make hanging domed fabrics. The mimicry between *Philemon*—called Friar-bird, Monk, or Leather-head, from the bare head and ruff of some species—and *Mimeta* has been already noticed (p. 543). Cloaks are fashioned from the Stitch-bird's feathers, as well as from those of the O-os (p. 564).[1]

Fam. XXVII. **Zosteropidae.**—The "White-eyes," so denominated from the white ring usually surrounding the eye, form a single genus, *Zosterops*, of doubtful position. They range through parts of the Ethiopian Region, with Madagascar and the Comoros, and occupy most of the Indian and Australian Regions, whence they reach to Amur-land and Japan. The straight or slightly curved bill has the maxilla serrated and nearly always notched; the metatarsus is of medium length; the outer and middle toes are partially united; the wings are rather short with little or no exterior primary; the tail is moderate, broad and square, or even emarginated. Dr. Gadow[2] pronounces the protractile tongue to be forked and smooth in *Z. lateralis*; Mr. Beddard[3] finds the margins folded, and the tip frayed out in *Z. simplex* and *Z. japonica*. The sexes are alike, the coloration being principally olive and yellow, relieved by brown, grey, fawn, or white. The habits are similar to those of the Meliphagidae; the eggs, however, are pale blue. *Z. caeruleseens*, the New Zealand "Blight-bird," destroys the "American Blight" (*Schizoneura lanigera*), an Aphid.

Fam. XXVIII. **Nectariniidae.**—The Old World Sun-birds, recalling the non-Passerine Humming-birds by their brilliant metallic coloration, are actually given the latter name in India, whence they extend through Southern Asia to Papuasia and North Australia. They also occupy the whole Ethiopian Region, while *Cinnyris osea* inhabits Palestine, *C. brevirostris* Baluchistan and South Persia, and an undetermined species the Muskat district in Arabia. *Promerops* is a doubtful member of the Family.[4]

[1] Cf. Buller, *Birds of New Zealand*, 2nd ed. i. 1888, p. 104; Wilson and Evans, *Aves Hawaiienses*, pt. i. 1890, p. 3. [2] *P.Z.S.* 1883, p. 63. [3] *Ibis*, 1891, p. 510-512.
[4] Shelley, *Monograph of the Nectariniidae*, London, 1880, p. xiii.

The long slender bill, without bristles of any kind, is much produced and curved in *Neodrepanis;* both mandibles being terminally serrated, except in *Promerops* and *Chalcoparia*, of which the former has the maxilla notched. The extensible tongue is bifid, with each half frayed out medio-ventrally, save in *Promerops*, where it is a semi-canal with dorso-laterally frayed edges. The metatarsi are moderate, the claws curved and acute. *Arachnothera* has both the bill and the feet stouter. The more or less rounded wings are of medium length; the tail varies from square or nearly so to graduated, and has two narrow elongated median rectrices in the males of *Hedydipna, Nectarinia, Anthobaphes, Aethopyga, Urodrepanis* and *Drepanorhynchus*. That of *Promerops* is extraordinarily long and graduated in both sexes. *Arachnothera chrysogenys* has the loral region naked, and the male of *Neodrepanis* bluish circum-ocular wattles.

FIG. 136.—Splendid Sun-bird. *Cinnyris splendidus.* × ½.

It is impossible to describe shortly the diverse coloration of the various species; some shew much green, black, brown, or olive; nearly all exhibit brilliant, if not metallic, red, blue, lilac, copper, yellow, or orange tints; a few are chiefly purple; many are longitudinally streaked below; in others the breast is white, or exhibits red or orange bands, while the fore-neck may be vermilion striped with lilac. The sides of the back frequently possess long downy feathers, and pectoral tufts are common. In *Arachnothera* both sexes are greyish or greenish, relieved by a little yellow or orange. Females, however, are usually sombre, the young being similar. The bill is black or brown, the feet vary in hue.

These small graceful forms, restless, though not shy, are rarely seen in companies, but usually in pairs; they frequent groves and forests up to an altitude of about a thousand feet, resorting to more open country and gardens when the shrubs are flowering. The food consists mainly of insects—sometimes taken on the wing—

with their larvae and spiders; while the birds hop actively about, and cling to the branches and trunks of trees, like Tits or Creepers, or even to bushes and grass. They rarely hover before flowers as Humming-birds do, though frequently sucking honey. When feeding or singing the wings are often opened and shut alternately. The quick, direct flight is accompanied by rapid pulsations of the pinions, and the males chase their rivals angrily. The shrill, but pleasing and varied notes recall those of the Willow-Warbler. The pear-shaped or oval nests, woven or attached by cobwebs to the ends of boughs, to the under surfaces of leaves, or more rarely to reed-stems, are composed of grass, moss, roots, and the like, lined with hair, feathers, and down, and usually have a projecting porch. Beneath are attached as decorations leaves, twigs, lichens, shreds of bark, paper, and cloth, wood-borings, or caterpillars' excreta. *Arachnothera magna*, at least occasionally, builds an open nest. The two or three eggs are commonly greenish- or brownish-grey, with purplish, reddish-brown, yellowish, or dusky dots and spots; some, however, are whiter, with blackish markings, dark zones, or hair-streaks; while those of *Arachnothera magna* are brownish, very thickly speckled with purplish-black. *Promerops cafer* makes a cup of grass, fibres, and softer materials in forks of bushes, and lays creamy eggs like those of Buntings, with wavy lines or irregular blotches of dark brown or purplish.

Fam. XXIX. **Dicaeidae.**—The "Flower-peckers" inhabit the Indian and Australian Regions as far eastwards as the Low Archipelago, a few possibly kindred species occupying West Africa. The bill is usually short, broad, and depressed, but is especially slender in *Pholidornis*, stout and Finch-like in *Prionochilus*; while both mandibles shew minute terminal serrations. Feathers cover the nostrils in *Pardalotus*, and in life *Lobornis* has three small white rictal outgrowths. The tongue is separated into four semi-tubular fringeless projections. The metatarsus is never long; the wings are fairly so; the tail is generally short and even, but is rounded in *Prionochilus vincens*, longer in most Papuasian forms, and sometimes graduated, as in *Pristorhamphus*. Many species exhibit vivid combinations of blue or purple with black, relieved by a scarlet or an orange head, rump, or chest-patch, the lower surface being yellow, greyish, or greenish-white; some, however, replace the blue shades by green, brown, or olive; others are quite plain; and *Melanocharis unicolor* is perfectly black. The Diamond-

bird (*Pardalotus*) has scattered white dots above, and scarlet or yellow tips to the primary coverts; *Dicaeum* often shews a longitudinal black band below: while bars and streaks occur not infrequently. The bill is blackish, or in *Dicaeum erythrorhynchum* reddish. The female is almost invariably duller.

These small birds frequent woods and gardens, the little flocks often haunting lofty trees near rivers; they hop briskly among the boughs, dart from bush to bush, creep about and cling like Tits, and utter a long, low warble, or in *Pardalotus* a harsh monotonous piping note. The food consists of insects, varied by spiders, fruit, buds, seeds, and perhaps honey. *Dicaeum* and *Prionochilus* suspend from some twig a domed, pear-shaped nest of white cottony material, frequently covered with grass or moss, and decorated with caterpillars' excreta; *Pardalotus* chooses old Swallows' nurseries, or holes in trees and walls, or even tunnels a short way into banks, making within a spherical fabric of roots, grass, bark, and feathers. The two to five eggs are commonly white, but in *Prionochilus* (*Piprisoma*) *squalidus* they are redder, with dense brown-pink or claret-coloured blotches or specks.

Fam. XXX. **Certhiidae.**—The Creepers, a small, though widespread group, occupy most of the Palaearctic and Nearctic Regions; Africa from Benguela to Mashona-Land; Australia and New Guinea. The bill is long and generally decurved, but shorter and straighter in *Climacteris*: while nasal and rictal bristles are absent. The metatarsi are of medium length and slender, though stouter in *Salpornis; Tichodroma* and *Climacteris* have the scutes fused; and the toes—especially the hallux—have long, curved claws. The wings vary from moderate and rounded to elongated and pointed; the tail is usually short and square, or very nearly so, but has stiff, graduated, acuminate feathers in *Certhia*. The coloration of both sexes is brown, black, rufous, buff, grey, and white, except in *Tichodroma*, which exhibits crimson wing-patches on its grey, black, and white plumage. Bars and spots are frequent, particularly beneath.

The majority are tame birds, inhabiting thinly wooded districts, often close to dwellings; but the European and Asiatic *Tichodroma muraria*, which has strayed to Britain, haunts mountain cliffs, and, when on migration, walls also. They utter shrill cries, or, more commonly, low reiterated notes, which in our Creeper (*Certhia familiaris*) are varied by a sweet and fairly loud song;

the food consists of insects and their larvae, ants, and spiders. Beginning at the bottom of a trunk the birds work actively but jerkily upwards in zigzags or spirals, flitting from the higher branches to the base of another tree; sometimes, however, they take protracted, undulating flights, or accompany flocks of Tits in winter. *Certhia* uses the rigid rectrices as Woodpeckers do (p. 457), though the soft-tailed forms also climb well, while *Climacteris* is exceptional in spending much time hopping or shuffling along the ground. Seeds of conifers occasionally vary the diet. The nest, composed of twigs, with the addition of grass or moss, and lined with bast, hair, wool, or feathers, is placed behind loose bark, under tiles, in crevices of trees or walls, in piles of bricks, hollow branches, or even the base of large birds' habitations. The three to nine eggs are ordinarily white with red and lilac spots; but in *Climacteris* the ground-colour is sometimes reddish, in *Salpornis* the spots are blackish. The last-named fixes a cup-shaped fabric of leaves, bark, and cobwebs to some horizontal bough.

FIG. 137.—Tree Creeper. *Certhia familiaris.* $\times \frac{7}{12}$.

Fam. XXXI. **Coerebidae.**—The Quit-quits have the extensible tongue bifid, and frayed out terminally. The bill may be conical, but is usually slender, with a notch and sometimes with rictal bristles, while the long maxilla is hooked in *Diglossa* and *Diglossopis*; the metatarsi, wings, and tail are moderate, the last being sometimes forked. These small, active, and restless birds frequent bushy places and the outskirts of forests, from South Florida to the Bolivian Andes and South-East Brazil, several species being peculiar to the Antilles, and *Certhidea* to the Galápagos. Though companies are seldom formed, the flight and habits are Tit-like, and individuals are often seen hopping about or clinging to the branches in search of the insects which, with fruit, form the usual food. They probe the flowers in company with Humming-birds, and probably suck the honey, while some forms dart after flies like Flycatchers. Several have a fine voice, but the common note is a feeble "quit-quit." The domed

nest, made of grass, moss, roots, and fibres, occasionally has a projecting porch, and is frequently lined with down or feathers; the two to four eggs being white or greenish-blue, with dull-red or yellowish-brown blotches or specks. In the Antilles *Certhiola* weaves a domed structure of similar materials, hair, and spiders' webs, between the outermost twigs of bushes. Many nests are built without being used.

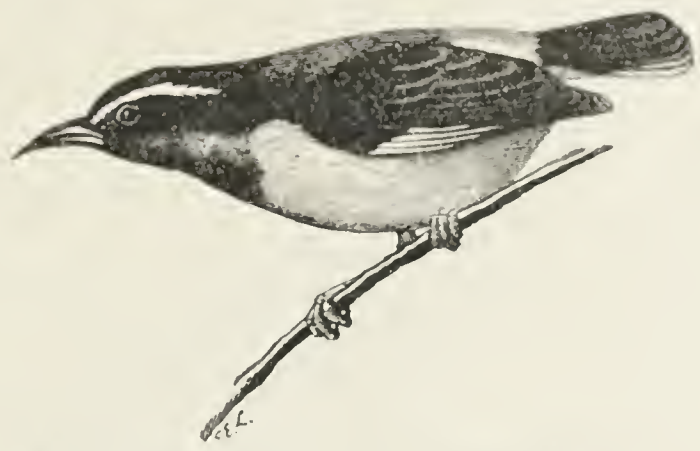

FIG. 138.—Sugar-bird. *Certhiola flaveola*. × ½.

The coloration varies from black, grey, or purplish, relieved by rufous and white, to brilliant blue, purple, or green, with the quills only black, or with further yellow, chestnut, and exceptionally scarlet, decorations. Uniform black, or olive and brown hues are unusual, save in females, which, however, are often bright green, with the addition of a little blue or yellow.

Fam. XXXII. **Mniotiltidae.**—The "American Warblers," almost replacing the *Sylviinae* in the New World, are a somewhat heterogeneous assemblage of rather small birds, of which *Granatellus* is perhaps Tanagrine. They frequent localities of all descriptions in North and South America, being commonest in the middle portions. *Teretistris* is peculiar to Cuba, *Leucopeza* to St. Lucia and St. Vincent; *Ergaticus* occupies the Central American highlands, while two or three species wander to Greenland.

The bill is usually slender and straight, but varies in length and curvature, that of *Setophaga* and *Myiodioctes* being broad and depressed with bristly gape, that of *Icteria* (doubtfully referred here) very stout and compressed, and so forth. Other species also exhibit bristles, or have notched beaks. The tongue is frequently bifid and fringed in *Dendroeca*, and in *D.* (*Perissoglossa*) *tigrina* is semitubular. The metatarsi are naturally longest and strongest in the more terrestrial forms, such as *Geothlypis* and *Siurus; Icteria* has partly feathered legs, *Mniotilta* particularly long toes. The wings may be concave and roundish, as in *Leucopeza* and *Geothlypis*, or elongated and pointed, as in *Protonotaria* and *Peucedramus*; the moderate tail is square, rounded, or emarginate, or, as in *Setophaga*, broad and graduated. The general coloration is

olive-green, grey, or slaty-blue, with yellow or rarely orange under parts; chestnut marks, white wing-bands, and the like, occasionally relieving the plumage. The head is often particularly dark or streaky. *Mniotilta* exhibits black and white stripes; *Ergaticus* shews chiefly crimson and white; *Granatellus* is grey, black, and white above, but red and white with black collar below. *Setophaga*, the "American Redstart," is mainly red and black, or red and plumbeous; *Cardellina* is grey, black, and white with crimson cheeks and throat; *Siurus* has olive-brown upper, and whitish under parts, with dusky striations. The bill is black or brown, commonly with pinkish, yellowish, or bluish mandible.

FIG. 139.—Black-and-White Warbler. *Mniotilta varia*. $\times \frac{1}{2}$.

These active, restless, and often shy birds either seek their food, consisting chiefly of insects and their larvae, worms, spiders, and even molluscs, upon the ground or upon the bark of trees. Many forms resemble Tits in their actions; *Mniotilta* and others ascend the trunks spirally like Creepers; *Setophaga* and its allies—and exceptionally *Dendroeca*—sally after insects like Flycatchers; *D. palmarum* and *Siurus* run along with the tail in motion, the former recalling a Titlark, the latter gaining, from its appearance and habit of wading, the name of Water-Thrush. The flight is usually swift, easy, and graceful, yet brief and frequently undulating; *Myiodioctes* and *Setophaga* flit about alternately opening and closing the rectrices. Fruits, including conifer- and grass-seeds, vary the diet. Small parties collect in winter. A few species, such as *Basileuterus*, *Setophaga*, *Myiodioctes*, and *Siurus* have fine clear songs, but the usual utterances are feeble warbles, sweet whistles, reiterated "chirrups," or mournful trills. The majority build their cup-shaped nests in trees, bushes, and thickets generally, *Dendroeca* in some districts choosing a fir; they are

made of grass, bark, leaves, roots, moss, hair, fur, lichens, and spiders' webs, or even twigs, sedges, and feathers, and contain from two to six creamy or, exceptionally, greenish or purplish eggs, more or less spotted or blotched with red-brown, grey, and lilac, or sometimes, as in *Myiodioctes*, scrawled with black.

Fam. XXXIII. **Tanagridae.**[1]—The Tanagers form a New World group, hardly distinguishable from the *Fringillidae*, except by their more feeble conformation and their exposed nostrils. The coloration is often particularly gorgeous, but their habits are comparatively little known. The bill varies much in length and thickness, the hooked tip being highly developed in *Lamprotes* and *Sericossypha*, while *Procnias* has a wide Swallow-like gape. The metatarsi are short and stout; the toes are large, with sharp curved claws in *Lamprotes* and *Sericossypha;* the wings are moderate and somewhat pointed, being unusually long in *Procnias;* while the tail may be very short as in *Euphonia*, but is rarely long and graduated as in *Cissopis*, and only occasionally forked.

These birds are characteristic of the forests and wooded country of the Neotropical Region, whence four species of *Piranga* extend to the United States, and two reach Canada and British Columbia respectively; several forms, moreover, are peculiar to the Antilles. They are chiefly of small size, *Euphonia* possessing the least and *Pitylus* or *Saltator* the largest members of the Family; the sexes are commonly similar, but the female is often duller, or even quite different from the male, as in *Rhamphocoelus* and *Pyranga*. A short crest occurs rarely, as in *Eucometis* and *Stephanophorus*. The prevailing colours are black and red or uniform red in *Pyranga*, *Phlogothraupis*, and most species of *Rhamphocoelus* and *Calochaetes;* blue or purplish-black and yellow in *Buthraupis*, *Iridornis*, and their nearest allies; blue and black in *Procnias* and *Pseudodacnis;* orange or yellow, with black and white in *Spindalis* and *Lanio;* black and white in *Lamprospiza* and *Cissopis;* olive and brown in *Chlorospingus;* chestnut and brown in *Orchesticus;* grey, olive, yellow, or green, with more or less blue in *Thraupis* (*Tanagra*). *Buarremon* and several other forms are comparatively dull; *Tanagra* (*Calliste*) exhibits a beautiful mixture of all the above hues; *Euphonia* is also varied, but lacks scarlet tints; *Chlorochrysa* is brilliant green, relieved by orange, chestnut, blue, and black. The bill may be red, black, yellow,

[1] For the Family see Sclater, *Monogr. Tanag.* 1857; and *Cat. Birds Brit. Mus.* xi. 1886.

leaden or horn-coloured. Roughly speaking, *Tanagra* contains sixty species, *Euphonia*, *Chlorospingus*, and *Buarremon* each over thirty.

The flight of these bold, lively, and restless birds—often met with in small parties—is Finch-like and not uncommonly brief; the song, frequently heard in chorus, is mellow and pleasing, accompanied by chattering, whistling, and chirping notes; the diet consists of insects and fruits, even the latter being occasionally snatched upon the wing; while worms, larvae, and molluscs are eaten, and some species scratch for food among fallen leaves. The nests are usually shallow fabrics of grass, roots, fibres, moss, and lichens, lined with hair or down; twigs, broad leaves, or fern-stems being commonly added below: they are sometimes placed in forks of trees or bushes, if not at the ends of branches; sometimes in masses of creepers, or even upon the ground; that of *Pyrruphonia* is domed, while that of *Rhamphocoelus brasilius* is built in tall grass in marshy places. The two to four eggs are white, bluish, greenish, grey, salmon-coloured, or rich brown, being at times uniform, but generally blotched, spotted, freckled, lined, or scrolled with brown, lilac, red, purple, or black. *Procnias* is said to lay three or four white eggs in holes in trees or in the soil, upon a bed of roots and plant-stems.[1]

FIG. 140.—Brazilian Tanager. *Rhamphocoelus brasilius*. $\times \frac{2}{3}\frac{9}{0}$.

Fam. XXXIV. **Ploceidae.**—The Weaver-birds, closely allied to the above, and hardly to be distinguished from the *Fringillidae* except by the tenth primary being distinctly developed, may be divided[2] into the Sub-families *Viduinae*, occurring in the Ethiopian, Indian, and Australian Regions, in which this quill is small

[1] Euler, *J. f. O.* 1867, p. 411. [2] Cf. Shelley, *Ibis*, 1886, pp. 301-359; 1887, pp. 1-47.

and falcate, and *Ploceinae*, peculiar to Africa and its islands—with the exception of the genera *Ploceus* and *Ploceëlla* of the Indian Region—in which it is larger. The former group includes the long-tailed Widow-birds, the red-beaked Wax-bills, and so forth; the latter the more typical Weaver-birds; Africa furnishing by far the greatest number of species. The bill is normally strong and conical, but is unusually long and slender in *Emblema*, and particularly stout with ridged culmen in *Amblyospiza*; the maxilla may be toothed, as in *Pyrenestes*, or festooned, as in *Spermestes*. The metatarsus is moderate, and the hind claw sometimes lengthened, as in *Icteropsis*. The rounded or pointed wings have very long secondaries, and the tail shews a slight fork; while in the breeding season the four median rectrices in the males of *Vidua* and several allied genera are extraordinarily elongated, being then either broad or tapering, and reduced to threads at the extremity, or bare-shafted with "racquet" tips.[1] Crests are uncommon, hair-like plumes on the nape more frequent, while *Pyromelaena* and *Urobrachya* have a neck-frill in summer.

FIG. 141.—Weaver-bird. *Pyromelaena flammiceps*. $\times \frac{7}{12}$

The coloration of these rather small birds is most striking, though the females are usually much duller than the males, which have in some cases a sober winter garb. *Vidua principalis* is black and white; *Penthetria ardens* is black with scarlet gorget; *Philetaerus socius* is brown, buff, black, and white; *Zonaeginthus bellus* is brown above, with transverse black lines and crimson rump, but silver grey below with black bars; *Hypochera ultramarina* is entirely purplish-blue; *Sporaeginthus amandava*, the Amadavat, is chiefly crimson with white dots; *Munia oryzivora*, the "Java Sparrow," is blue-grey and black with white cheeks. *M. punctulata*, the Cowry- or Nutmeg-bird, is brown,

[1] For a full account of the tail-feathers of these remarkable birds, see Strickland, *Contrib. Ornith.* 1850, pp. 88, 149; A. Newton, *Dict. Birds*, 1896, p. 1030.

with white streaks above and spots below, a yellow rump, and a white middle to the under parts. *Poëphila mirabilis*, one of the "Grass-finches," shews a beautiful combination of pale green, blue, lilac, scarlet, yellow, black, brown, and white; *Ncochmia phaëton* is crimson, brown, and black; *Foudia* is generally crimson and black; *Hyphantornis cucullatus* is golden-yellow, black, and chestnut; *Ploceus baya* is yellow and brown; *Textor albirostris* is entirely black. The bill is not uncommonly coral-red, as in *Estrelda* and other "Wax-bills;" but it varies from red to horn-coloured in *Vidua*, and may be whitish, as in *Textor albirostris*, as well as black, grey, rose-tinted, brownish, orange, or nearly blue. The feet may also be red, brown, purplish, dusky, or flesh-coloured.

Weaver-birds are generally tame, and often approach habitations; the larger species frequenting woods and gardens, open country, sugar-cane fields, or reed-beds, but many of the smaller preferring grassy flats, bushy places, or even stony hills. They are usually social, and frequently pugnacious. The flight, though somewhat brief and heavy, is fairly rapid; *Chera* and *Vidua* rise with arched tail, and hover with flapping wings, at times soaring almost out of sight to descend again with great velocity. *Sycobrotus* climbs especially well, *Donacicola* hangs to the reeds like a Bunting, and indeed it is doubtful whether the Australian forms are not really generalized Finches. The usual utterance is a harsh churr, a shrill piping cry, a chattering or a twittering noise, often preceded by a single mournful note; but some species sing fairly well in chorus. The food, generally procured upon the ground, consists mainly of seeds, but is varied by insects—occasionally taken on the wing,—fruits, and flowers; while the birds play havoc with rice and other crops, often clinging to the stems until they have eaten every grain from the head.

The nest is almost invariably a large mass of roughish grass or flags, bristling with the thicker ends of the stalks; it is usually lined with finer stems, but sometimes with feathers, down, and wool, while sticks, twigs, roots, and the like may be added exteriorly. The fabric is normally "retort-shaped," that is to say, globular with a "spout" or tubular passage, which curves downwards either from the middle or from the top of one side; but some of the structures resemble flasks placed horizontally; others have little or no spout, or hang by a sort of rope; and occasionally the materials do not quite meet above. Weaver-birds, especially the more typical

species, commonly build in colonies, the most remarkable instance being that of *Philetaerus*, where an umbrella-shaped mass of sticks and straw is formed among the branches of a tree, and in its flat under surface holes for as many as three hundred nests are excavated. *Textor* makes a somewhat similar joint fabric. In certain cases the hen is said to sit in the roughly-fashioned shell, and to receive the thin ends of the straws from her mate, as he, clinging to the outside, pushes them through with his beak; she then passes them through to him again, and so the process is repeated in true webster fashion. An inner partition is often made to prevent the eggs from rolling out. The structures are placed in trees or bushes, frequently overhanging water, in sugar-canes, reeds, foundations of Eagles' eyries, or—especially by the smaller species—in long herbage. Exceptionally they are found under eaves. *Ploceipasser mahali* makes two "spouts," *Ploceus baya* counterpoises its pensile nursery with lumps of clay. The males add to the fabric after their consorts begin to incubate, and are asserted to make nests to sit in; the hens occasionally lay together, though the cocks are not proved to be polygamous. *Munia*, *Stictospiza*, *Sporaeginthus*, and in fact most Indian and Australian forms, deposit from five to seven dull white eggs; *Ploceus* lays two of a like description; *Ploceëlla* two, which have a whitish or greyish ground with brown frecklings; the Ethiopian species about five, either plain white, blue, or green, or of the same colours, spotted and blotched with red or purplish-brown. In nests of *Hyphantornis* and *Pyromelaena* very diverse specimens are often found.

Fam. XXXV. **Icteridae.**—This New World group comprises the "American Orioles" or "American Starlings," which are certainly not Orioles, though analogous to the Starlings, and allied through *Dolichonyx* to the Buntings. From the *Fringillidae* they are distinguished by the more elongated bill, which has no notch, and by the absence of rictal bristles. Dr. Sclater[1] recognises five Sub-families: *Cassicinae*, with long, straight, and often large bills, widening to a frontal shield; *Agelaeinae*, where they are conical with flattened culmen, being shortest in *Dolichonyx* and *Molobrus*; *Sturnellinae*, where they are more slender; *Icterinae* and *Quiscalinae*, where the culmen is rounded, the length and curvature varying more than elsewhere. *Aphobus* and *Curaeus* have grooved mandibles, *Gymnostinops* a naked space at their base, *Clypeïcterus*

[1] *Cat. Birds Brit. Mus.* xi. 1886, p. 309.

a horny swelling there. The legs are stout, being long in the terrestrial Agelaeinae, Sturnellinae, and Quiscalinae, and not much shorter in the Icterinae and Cassicinae; *Dolichonyx* has the middle toe, and the Sturnellinae the hallux elongated. The wings are long or moderate, being often pointed with far-extended outer secondaries in the Sturnellinae. The tail varies in length and form, but is much graduated in the Quiscalinae (Boat-tails), which usually carry it in flight with the outer feathers uppermost; it has acuminate rectrices in the Sturnellinae, *Leistes*, and *Dolichonyx*, while in the last-named it is forked. *Cassiculus*, *Eurycorystes*, and some species of *Ostinops* have crests, the male of *Cassidix* a neck-frill, *Lampropsar* erect frontal plumes, the Sturnellinae bristly crown-feathers, *Hypopyrrhus*, *Curacus*, and *Aphobus* lanceolate feathers on the head. *Gymnomystax* possesses naked orbits.

The *Cassicinae*, or Cassiques, are sometimes uniform black, sometimes black relieved by chestnut, yellow, green, or scarlet; the bill being frequently white, instead of the usual black or brown. The Agelaeinae are generally black, varied with red and yellow, *Dolichonyx oryzivorus*, the Bobolink, being, however, black, brown, buff, and white, with a duller plumage in winter. The Sturnellinae are brown, variegated with black; having scarlet or canary yellow under parts, and in *Sturnella magna*, the "Meadow-Lark," a black gorget. The Icterinae (all but one of which belong to the extensive genus *Icterus*) are glossy black, with yellow, bay, or orange patches—especially upon the rump and lower surface—and often some white on the wing. The Quiscalinae are black, occasionally with metallic gloss, and scarlet or brown markings. The females are commonly similar to the males, especially in the Cassicinae, but are sometimes comparatively sombre. *Agelaeus phoeniceus*, the "Red-winged Starling," several males of which have been captured in Britain, *Icterus baltimore*, the "Baltimore Oriole" and *Quiscalus versicolor*, the "Crow-Blackbird," are good examples of their respective groups. The curious resemblance of *Sturnella* and *Macronyx* has already been mentioned (p. 500).

Some of the Family are large birds for Passeres, *Gymnostinops*, for instance, being the size of a Rook; they are commonly gregarious, and frequent forests or wooded country, the Agelaeinae and Sturnellinae in particular preferring open grassy places and marshes, and all seeming fond of the neighbourhood of water. The Cassicinae only range from South Mexico to Paraguay and Bolivia; but the other

Sub-families occupy most of America, except the extreme north, the Quiscalinae extending to Chili and Argentina, the Sturnellinae to Patagonia. Several species are peculiar to the Antilles. The flight is sufficiently strong and swift, flocks of *Agelaeus* and *Quiscalus* performing evolutions like Starlings; while these forms, *Dolichonyx*, *Scolephagus*, *Xanthocephalus*, and others roost in huge companies on migration. These lively, active, and fairly tame birds differ considerably in habits, *Dolichonyx* sitting continually on fences, clinging to plant-stems, or hovering in the air, *Sturnella* sailing or fluttering with jerky movements, the Icterinae

FIG. 142.—"Baltimore Oriole." *Icterus baltimore*. $\times \frac{1}{2}$.

and Cassicinae being particularly accustomed to perch, and many forms walking well or even gracefully. The members of the genus *Icterus* have melodious voices, those of *I. vulgaris* and *I. baltimore* being especially rich and varied: they are therefore favourite cage-birds. *Dolichonyx*, perhaps the finest of American songsters, often sings in chorus; *Sturnella* produces tuneful, wild, but not powerful notes; the Cassicinae utter loud discordant cries or sweeter strains: while many forms chatter, chuckle, squeak, scream, or whistle more or less harshly, whether in the air, in the trees, or on the ground. The food in the breeding season consists almost entirely of insects, their larvae, and small molluscs; but fruit is also eaten, and havoc wrought in maize- and corn-fields, *Quiscalus* even pulling up the shooting blades. The terrestrial species often

scratch amongst the soil, but the Icterinae and Cassicinae rarely feed upon the ground.

The Agelaeinae build cup-shaped nests of grass, sedge, or rushes, sometimes lined with hair, in bushes or reeds, generally in damp or marshy spots; and lay five or six white, drab, greenish, bluish, or reddish eggs, with purple, black, red, or brown blotches, dots, and lines: the Quiscalinae deposit similar eggs in rougher structures of twigs, grass, and the like, placed in tree-forks or bushes. Both these groups often form societies. *Sturnella* hides its deep fabric in grass or rushes, the eggs being speckled rather than spotted; the Icterinae, or "Hang-nests," usually weave pensile nests of plant-stems, tendrils, grasses, or even rags, lined with wool, down, and so forth, which are rarely domed, and generally contain five or six eggs of a more delicate colouring than those of their kindred, varied by marblings, zigzags, streaks, and spots of brown, purple, black, or red. The Cassicinae commonly join in colonies and hang their elaborate, purse-like nurseries of grass or palm-fibres, *Tillandsia*, *Bromelia*, or lichens, lined with feathers, from branches above water; the two to five eggs are plain white, or greenish- bluish- or reddish-white, blotched, dotted, dashed, or scrawled with purplish- or reddish-brown and black.[1]

The gregarious Cow-birds (*Molobrus*), included in the Agelaeinae, lay eggs varying from white to pinkish, greenish, bluish, or brownish, often spotted or streaked with red, brown, and grey; one or more of these are by most species foisted in Cuckoo fashion upon other birds, the young of which disappear at an early date. It is a curious fact that *M. rufo-axillaris* is ordinarily parasitic on its congener *M. badius*, which itself seizes and uses other birds' nests. Many eggs are destroyed by the males, or are dropped promiscuously by the females, several of the latter often laying together. Cow-birds perch on cattle or follow the plough for insects, and utter ringing screams in concert.[2]

Fam. XXXVI. **Fringillidae.**—The Finches are small birds very closely allied to the *Tanagridae* and the *Ploceidae;* while the Buntings are here included in the Family, though often separated as *Emberizidae*. The most evident points of distinction in the

[1] *Cassidix oryzivora* is parasitic on other forms; Goeldi, *Ibis*, 1897, p. 364.

[2] For the Pigeon-like conduct of the courting male, see Hudson, *Argentine Ornithology*, i. 1888, pp. 73, 87.

last-named are the considerable deflection of the posterior portion of the angular gape and the bony knob often present on the palate; a gap, moreover, commonly occurs between the edges of the maxilla and the mandible. Extreme forms are thus easily recognised, but it seems almost impossible to draw an exact line of demarcation, even when the more Lark-like nest of Buntings and their streaky eggs are taken into consideration. The *Fringillidae* predominate in the Palaearctic Region, but are fairly plentiful elsewhere, except in the Australian Region, whence few are as yet recorded; many forms, however, have very limited ranges; while some are peculiar to certain islands, as *Geospiza*, *Camarhynchus*, and *Cactornis* to the Galápagos, *Passer jagoënsis* to the Cape Verds, *Chaunoproctus* to the Bonin Islands and *Telespiza* to the Laysan group, *Nesospiza* to Tristan da Cunha, *Melopyrrha* to Cuba, *Rhynchostruthus* and *Passer insularis* to Socotra.

The bill is usually stout and cone-shaped, often with a notched maxilla, occasionally with a ridged culmen; it is enormous in *Geospiza*, *Camarhynchus*, *Chaunoproctus*, and some other forms, and highly developed in *Coccothraustes*, *Pyrrhula*, and elsewhere; but is at times either remarkably short, or longer and more slender, as in *Cactornis*, *Chrysomitris*, and *Carduelis*. Frequently it is curved, with overhanging tip, while a peculiar crossing of the mandibles at their extremities marks the genus *Loxia*. An excessive summer growth has been especially noticed in Redpolls, which is worn down by hard food in winter. The beak is seldom abnormal in Buntings. The metatarsus is moderate; but in *Calcarius*, *Plectrophenax*, *Nesospiza*, and *Chamaeospiza* the hind claw is elongated, as is the mid-claw in *Phonipara*. The wings, which have a minute outer primary, vary from very long, as in *Hesperiphona*, to short as in *Passer*, and from pointed, as in *Plectrophenax*, to rounded as in *Ammodramus*; the secondaries are shaped like a bill-hook in *Coccothraustes*, while the inner are much lengthened in *Emberiza fucata*. The tail is fairly normal, but may be long or decidedly short, square, round, graduated, or forked; the rectrices are unusually acute in *Spiza*, *Coryphospiza*, and *Emberizoïdes*. Many species possess a crop. Bristles generally occur at the gape, and the nostrils are concealed by feathers or by a membrane.

The sexes may be similarly coloured or very different, the hues being commonly sober, but sometimes particularly brilliant. *Cardinalis*, *Paroaria*, *Gubernatrix*, *Melophus*, *Pyrrhuloxia*, *Schis-*

tospiza, *Lophospingus*, and *Tiaris* have fine crests; *Catamblyrhynchus* exhibits stiff crown-feathers. The feet are usually dull, but occasionally pinkish, as in *Embernagra* and *Pycnorhamphus;* the bill may be blackish, yellowish, dusky, or even red, as in *Cardinalis* (except one form). Of British species, the Greenfinch (*Ligurinus chloris*), the Goldfinch (*Carduelis elegans*), the Sparrow (*Passer domesticus*), the Chaffinch (*Fringilla coelebs*), the Brambling (*F. montifringilla*), the Linnet (*Linota cannabina*), the Redpoll (*Aegiothus rufescens*), the Bullfinch (*Pyrrhula europaea*), the

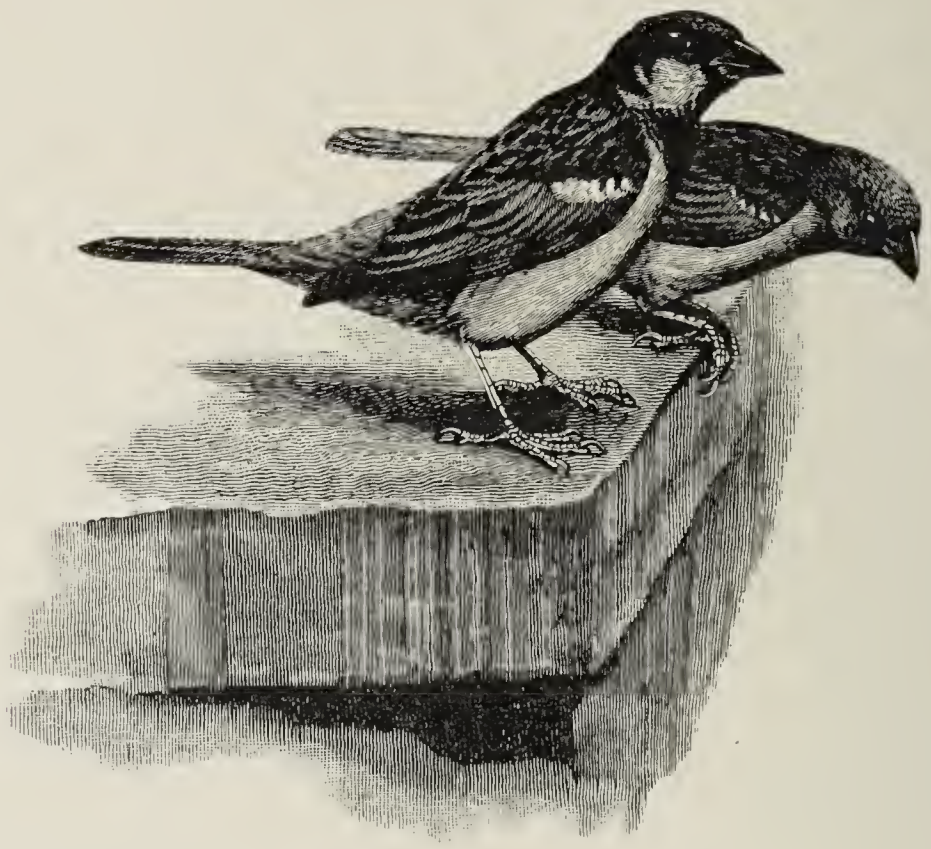

FIG. 143.—House-Sparrow. *Passer domesticus.* × $\frac{2}{5}$. (From *English Illustrated Magazine.*)

Reed-Bunting (*Emberiza schoenielus*), the Corn-Bunting (*E. miliaria*), and the Yellow Hammer (*E. citrinella*) hardly need description; while several others occur more rarely in our islands or breed with us in limited numbers, such as the Hawfinch (*Coccothraustes vulgaris*), which is bay, black and white; the Siskin (*Chrysomitris spinus*) and the Serin (*Serinus hortulanus*), which are chiefly greenish-yellow; the Pine-Grosbeak (*Pyrrhula enucleator*) and the Crossbill (*Loxia curvirostra*), which are mainly red in the adult male, and respectively yellow and greenish-orange in the female; the Ortolan Bunting (*Emberiza hortulana*), which is brown, green, and yellow; and the Snow-Bunting (*Plectrophenax nivalis*), with its black, chestnut, and

white plumage, that becomes black and white in summer. The Rose-Finches (*Carpodacus*) of the Eastern Palaearctic, the Nearctic, and the Indian Regions exhibit fine crimson or rosy tints; the Central and South American *Pheucticus*, and the Western North American *Hesperiphona*, much black and yellow; the Cardinals (*Cardinalis*), of North America, Venezuela, and Trinidad, bright red with black forehead and throat: *Paroaria*, which replaces the last-named genus southwards, somewhat like colours. *Guiraca* of most of America, except the extreme north and south, is mainly blue; *Cyanospiza cyanea*, ranging from the Eastern United States to Panama, is even more brilliant; while the Painted Bunting (*C. ciris*), of similar range, shews a beautiful combination of blue,

FIG. 144.—Snow-Bunting. *Plectrophenax nivalis.* $\times \frac{1}{2}$.

red, brown, and yellowish-green. *Volatinia* of Central and South America is black; *Geospiza*, *Camarhynchus*, and *Cactornis* are the same, or decidedly dull: *Petronia brachydactyla* and *Passer simplex*, of the deserts from North Africa to Persia, resemble the sand in tint. The wild Canary (*Serinus canarius*) of Madeira, the Azores, and the Canaries—not to be confounded with the Cape Canary (*S. canicollis*)—is greenish above with brown striations, and yellowish below. Finally, many sober-hued North American genera, such as *Pipilo*, *Peucaea*, and *Junco*, lead up to the brown-streaked Bunting forms.

The crimson tints exhibited by the adult male Linnet, when in breeding plumage, afford a well-known instance of seasonal change of colour. It is in consequence indifferently called the Red, Brown, or Grey Linnet.

The members of this Family generally frequent wooded districts and open grassy spots, Finches on the whole preferring the former, Buntings the latter; a few occupy sandy deserts; *Petronia* haunts rocks; *Ammodramus* resorts to the shore. This bird clings to the reeds like a Tit, a habit well-known to be shared by various other marsh-loving species. *Camarhynchus* and *Geospiza* accompany flocks of Doves to dry bushy and rocky spots near the sea in the Galápagos. The majority are active and lively birds, social and seldom shy, which flock in winter to feed or roost; while the pugnacity of the Sparrow is rather exceptional. They not only dust themselves in dry spots, but bathe freely. *Montifringilla* breeds in mountainous places, *Leucostiete* and *Pleetrophenax* in similar situations, or on rocky Arctic shores. The flight is ordinarily strong and rapid, some species of *Sycalis*, *Phrygilus*, and *Calamospiza* soaring, and descending with outspread wings; *Caetornis* climbs with ease about the prickly pear (*Opuntia*), while many Finches hop well, and others run readily and swiftly. The song is often exceptionally fine, as in the Canary, Linnet, Cardinal, American Song-Sparrow (*Melospiza*), *Chondestes*, *Zonotriehia*, and elsewhere; the Bullfinch in the wild state has a plaintive pipe; while the chirp of Sparrows may be contrasted with the Cricket-like strain of *Petronia brachydactyla*, the whistling cry of the Snow-finch (*Montifringilla nivalis*), the long-drawn note of the Corn-Bunting, or the sibilant sound at times made by the Crossbill. The food consists mainly of seeds, but other fruits, buds, leaves, insects and their larvae, are also eaten, not to mention peas, crocus flowers, and the like; Crossbills and some other forms cleverly extract the seeds of fir-cones, *Camarhynchus* and *Geospiza* scratch about upon the ground, and *Caetornis* devours seeds and flowers of the *Opuntia*. The nest varies from the huge, untidy domed mass of straw and feathers fashioned by Sparrows to the small compact cup of moss, wool, hair, down, lichen, and such materials, formed by the Goldfinch, Redpoll, or Chaffinch; Hawfinches and Bullfinches make shallow structures chiefly composed of twigs and lined with roots; the British Buntings build with grass and horse-hair if possible; *Phonipara* and other species sometimes make covered fabrics; *Sycalis pelzelni* occasionally utilizes nests of other birds. The site may be in a tree, bush, rock, building, or on the ground, some forms nidificating under cover, some in the open. Sparrows have black, grey, and white eggs; those of

the Linnet, the Goldfinch, and their allies are blue, bluish-white, or greenish, with reddish or brownish spots; those of Buntings are whitish, greenish, or ruddy, with brown, blackish, or rufous marks, ordinarily including streaks and scrawls; those of *Petronia brachydactyla* are white with blackish blotches; those of the Hawfinch green with olive and umber spots or lines; those of the Snowfinch white; those of *Spiza guiraca* and some other American species plain bluish or greenish.

With the Fringillidae this volume ends, according to the Classification which has been here adopted; but it may be well to take the opportunity of again reminding the reader that the "Families" of Oscines are not of equal rank to those of the Orders which precede them; and that, as regards the arrangement of these "Families," few writers will be found to agree; the truth being that there never can be a perfectly satisfactory linear system, since affinities point in so many different directions. When all these affinities have been finally investigated by anatomists, if ever that time should come, they may very possibly necessitate an alphabetical arrangement of the groups, with indications of their various relationships under each head.

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